WATER AND LIQUID WASTE MANAGEMENT

- POLICIES
- SYSTEMS PLANS
- PROGRAM

no 8

TULARE COUNTY

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WATER and LIQUID WASTE MANAGEMENT

POLICIES • SYSTEMS PLANS • PROGRAM

. . . . . AN ELEMENT OF THE TULARE COUNTY GENERAL PLAN

Tulare County Planning Department

DECEMBER, 1971

April 1, 1972

The Tulare County Association of Governments
Tulare County Courthouse
Visalia, Ca 93277

The Honorable Board of Supervisors
Tulare County Courthouse
Visalia, Ca 93277

Gentlemen:

I am pleased to submit to you the Water and Liquid Waste Management Policies, Systems Plans, and Programs -- an element of the Tulare County Area-wide General Plan.

This study is the culmination of two year's work in reviewing the water and sewer problems in the county, as well as attempting to predict needs to the year 1990 in additional urban lands, as well as sewer systems and facilities and water systems and supplies. It contains a comprehensive overview of the growth patterns in the county, the employment predictions, identification of areas of poor housing and areas where water supplies are in jeopardy through potential pollution from various sources.

It is a combined effort of the County Planning Staff, a private consultant consortium, and various cooperation public and private agencies, with assistance from staffs of the various communities within the county.

The Association wishes to thank the Board of Supervisors for their efforts in assuring that this study was indeed an area-wide study and for their financial and staff resources in securing its satisfactory completion.

I am confident that this element will provide a valuable tool in efforts to provide a better environment for the citizens of Tulare County.

Very truly yours,

Donald A. Woolfe

Donald A. Woolfe,
Executive Secretary
TULARE COUNTY ASSOCIATION OF GOVERNMENTS

DAW:ew

This Report Prepared Jointly By:

THE TULARE COUNTY PLANNING DEPARTMENT AND PLANNING ENGINEERING CONSORTIUM:

DONALD A. WOOLFE, Director

DARRELL V. HARMON, Ass't. Director**

GRUNWALD CRAWFORD ASSOCIATES
807 Irwin, Hanford, California

ENGINEERING SCIENCE, INC.
1534 North West Avenue
Fresno, California

JAMES F. SORENSON
Bank of America Building,
Visalia, California

PROJECT MANAGERS

Wallace E. Austin, Planner IV
Gloria S. McGregor, Planner IV
James H. Beath, Planning Technician*

PROJECT MANAGERS (Consultants)

Robert Grunwald
Richard Bentwood
James F. Sorenson

PROJECT STAFF

George A. Finney, Planner III
Fred H. Hover, Planner II
Robert Staller, Planner II
Roger B. Taylor, Planner I
Gregory Dowds, Planning Technician
Angela Win-Chi Koo, Research Assistant
Henry King, Research Assistant

CONSULTANTS' STAFF

Dennis Keller (G.C.A.) & (J.F.S.)
Ralph Madgral (J.F.S.)
Don R. Crawford (G.C.A.)
Donald J. Christensen (G.C.A.)
Maurice E. Strauss (G.C.A.)
Jeffrey D. Webster (G.C.A.)
Shirley A. Hickersen (G.C.A.)
Judith Warmerdam (G.C.A.)

GRAPHICS

Darrell Hill, Illustrator, Coordinator*
James Godsey, Control, Supervision
John W. Weldon, Draftsman
David Moore, Draftsman
Frank J. Gomez, Draftsman
Joyce Kazarian, Draftsman
Bret Ball, Draftsman*

TYPING

Esther Walker

PRINTING

Central Duplicating, Nina Jordan
Carl and Irving Printers, Tulare, California
C & H Reproductions, Visalia, California

And the Planning Staffs of the Cities of Visalia, Porterville, Tulare.

* Resigned
** Deceased

DAVID OGDEN,
County Administrative Officer

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TULARE COUNTY WATER AND LIQUID WASTE MANAGEMENT PLAN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Purpose

The program was undertaken for a variety of significant reasons:

1. State Planning Law mandates the preparation of public facilities plans within the context of the County's General Plan. The completion of this plan, therefore, supplements and strengthens the existing County General Plan. It is intended that these studies be adopted as official elements of the General Plan.
2. In order to remain eligible for the reception of public facilities grants and loans for unincorporated communities and incorporated cities of less than 5,500 population from Farmers Home Administration, the County must adopt a county-wide sewer and water master plan consistent with FHA criteria.
3. The Tulare County Association of Governments in order to receive certification as an official review and distribution agency for federal facility grant in aide programs for all communities regardless of size, must prepare and adopt an area-wide Water and Sewer System plan consistent with criteria developed by the Department of Housing and Urban Development.
4. Completion of this project partially fulfills a long standing need for the examination of policies linked to public resource allocations particularly in the county's rural areas. It also provided an opportunity to develop information regarding the utilization of physical, social and economic resources upon which rational growth forecasts were developed for all areas of the county. Execution

of the program has therefore served to bridge the noticeable information gap left as a result of the limitations of the scope of the county's 1963 General Plan.

The purpose of the study, therefore, is not only to circumscribe functional sewer and water planning issues but to provide a unique opportunity to develop a county-wide growth strategy and the rural element of the County's General Plan by forcing an examination of existing and future environmental and land use issues in both rural and peripheral/urban areas. It is evident that an objective and comprehensive analysis of sewer and water system cannot be rationally separated from an analysis of rural growth determinants.

Finally, in a pragmatic sense, the program further serves to lay the foundation for the development of a consistent administrative and political policy framework within which the validity of various public and private development proposals may be judged.

METHODOLOGY:

Six classifications of communities were developed for ease of reference and analysis of physical, economic and social factors affecting development. The classifications permit a differentiation among communities of the same class as well as distinction among communities within different classifications. The six classifications are: the Farm Labor Residential Community; the Minor Rural Service Center; the Major Rural Service Center; the Municipality; the Unincorporated Residential Tract; and the Recreation Oriented and Retirement Community. Most of the unincorporated communities which have a potential for significant development are included within the Farm Labor Residential Community, and Minor Rural Service Center classifications.

The Kaweah River basin and the community of Three Rivers were given special study and attention because of its strategic location and the ecological fragility of the area.

The planning areas identified within this report were currently evaluated in terms of character, description, and present population trends; financial condition of the area, local governmental structure; social characteristics of residents; natural resources and economic potentials thereof; water resources; agricultural land ownership patterns; land use and trends in such use; agricultural production and trends thereof; trends in real estate values; potential for recreation and tourism; adequacy of existing schools, transportation and other public facilities and the obvious needs for improvement thereof; existing plans for the area, including overall economic development programs; adequacy of existing community sewer and water systems, including numbers of families without such service, without a safe water supply and with unsafe sewage disposal facilities.

Uncertainties regarding the future of many communities, particularly those minor rural service centers and residential tracts which have a high incidence of sub-standard housing, a low assessed valuation, and a low level of public services and facilities required for an adequate urban existance lead to the conclusion that there are several communities in the county which may be classed as "non-viable" (not likely to achieve a state of development permitting continued provision of satisfactory community services -- an improbable growth future) unless some unforeseen set of circumstances drastically alters the present decline of such communities. Heavy tax burdens which would be imposed by attempts to improve service and facility operations would only place such economic encumbrances on individual families as to further encourage relocation to larger communities where the tax burden is lighter due to its absorption by a larger population as well as the existance of a substantial industrial and commercial base. Conversely, communities with larger, growing populations and broader or more reliable economic foundations may then be termed "viable" for purposes of this study.

Sketch plans (highly generalized growth policy plans) presented graphically in Chapter VIII indicate the general magnitude and location of future growth and development. They were produced through consideration of such factors as existing development policy; expansion capability; ability to provide various public facilities such as water and sewer services; and various physical and economic constraints and opportunities which exist for accommodating future growth.

The amount of land required for expansion of cities and communities varies in relation to such factors as: (1) the economic role of the community in the county and sub-planning area; (2) population size, quality and character of the existing development pattern; (3) service levels currently provided to

meet the needs of the community; and (4) the strategic geographic location within the area and the region. These factors are expressed in Table III-14 in terms of the number of acres required per thousand projected population for each major category of use. This ratio also reflects an additional increment to allow for choice in the selection of sites for major uses and recognition of market realities in order to provide for a reasonably dynamic land development market. Future land requirements are shown in Table III-15 and range from 62-80 acres per added thousand population, depending on factors mentioned above.

Sketch plans for unincorporated communities, together with water and sewer plans, will provide the framework for the preparation of more detailed and comprehensive general plans, as the need develops. Sketch plans have been prepared and described in this report for Exeter, Farmersville, Lindsay, Woodlake, Camp Nelson, Cutler-Orosi, Earlimart, Goshen, Pixley, Springville, and Three Rivers, all of which had a 1970 population of 1000 or more and are expected to increase 300 or more in population by 1990.

STUDY LIMITATIONS

This study is limited by the lack of availability of detailed 1970 census data, consequently staff was often forced to use dated secondary sources updated by knowledge of local problems. Also, due to the prodigious scope of the study, there was an inadequate amount of time to evaluate all significant issues in the desired detail.

Further, the scope of the study was limited to unincorporated communities and cities with more than 5,500 population. However, the counties four larger cities will be included within the scope of a supplementary and complimentary study funded, in part, by the Department of Housing and Urban Development. This program, upon adoption, will also become an integral part of the county-wide General Plan.

Finally, linkages between political, social, economic and physical determinants of county-wide growth must be explored in greater detail before completely satisfactory and defensible solutions may be developed within the context of our general plan studies.

GROWTH PROJECTIONS -- A BASIS FOR PLANNING ASSUMPTIONS

The following findings and assumptions served as background data and foundations for this study.

1. The population of Tulare County is expected to reach approximately 227,000 by 1980 and 272,000 by 1990, based on assumptions that the county will experience a net in-migration of population and higher levels of non-agricultural employment than has occurred over the past 20 years.
2. By 1990, the cities and their urban areas will account for approximately 80 percent of the county population, as compared to 62 percent in 1970.
3. By 1990, the rural farm population will have declined to the point where it comprises only slightly more than 5 percent of the total county population, as compared to approximately 20 percent in 1970.
4. By 1990, the aggregate population of unincorporated communities will represent approximately 14 percent of the county population, as compared to 17 percent in 1970. However, 16 of the communities are expected to lose population, 5 are expected to remain fairly stable, and 18 are expected to gain in population.
5. Agricultural employment experienced a 32 percent gain from 1960 to 1970 in Tulare County, in contrast to the four county region of the southern San Joaquin Valley, where gain for the same period was only 8.8 percent. Tulare County agricultural employment increase may be attributed to the addition of thousands of acres of agricultural production, and major increases in such labor intensive crops as grapes and citrus.

However, due to many factors, employment in agriculture is expected to begin to decline in the 1970's, resulting in a possible loss of several thousand jobs by 1990. Factors which may bring about such a decline include changes in crop varieties, employment requirements, farm size, production yields, harvesting and processing methods, agricultural services, commodity distribution, farm machinery, pest control, fertilizing, irrigation practices, and farm management. Changes within these factors have improved the economy of the agricultural community, even as they have caused job declines. These improvements have been somewhat offset by such negative factors as declining farm income relative to investment, inflation, labor problems, persistent unemployment, rise in welfare recipiency and level of welfare services, taxation policies and further aggravation of low income housing conditions.

6. Employment in manufacturing and non-manufacturing categories is expected to increase by 7,800 jobs (111.4 percent) (390 jobs per year) and 34,800 jobs (76.3 percent) (1160 jobs per year) respectively. These anticipated gains are expected to surpass those of 1960-1970, and as such, should serve to ameliorate the forecasted decline in agricultural employment.

7. County-wide employment and population projections are based on the assumption that relatively large-scale development will take place at locations appropriate for recreation uses within the Kaweah and Tule River watersheds.

8. Primary factors which may serve to influence retention of population in all rural (including non-viable) communities are: (1)

lack of employment opportunities and adequate and acceptable low-income housing in the larger communities, (2) pressures caused by lack of supply of standard housing forcing retention of sub-standard housing for in-migratory farm labor families, (3) inability to concentrate a reasonable variety of public services in selected communities, (4) inability to develop an effective action program aimed at family relocation to those communities providing a broader range of public and private services, (5) change in migratory habits of younger members of the family, (6) the realization of "rural redevelopment" implementation by federal government.

9. Cities and unincorporated communities included in the study which are expected to require additional land for urban expansion include: Exeter, Farmersville, Lindsay, Woodlake, Camp Nelson, Cutler-Orosi, Earlimart, Goshen, Pixley, Springville, and Three Rivers. Urban expansion within Three Rivers, however, may be negligible if current developmental obstacles relative to water quality and supply in the Three Rivers basin are not overcome.

10. Primary factors which should contribute toward a loss of population in the sixteen unincorporated communities forecasted to lose population are: (1) a general decline in agricultural employment, (2) employment opportunities, improved housing, and a broad range of public services and facilities available in larger communities, (3) gradual deterioration of the urban environment in certain unincorporated communities, (4) the lack of a healthy and substantial economic base which is a prerequisite to adequate financing, maintenance and operation of water, sewer and other public facilities.

11. Unincorporated communities which are expected to lose population because of factors mentioned above include: Allensworth, Alpaugh, Delft Colony, East Orosi, Lindcove, Monson, Plainview, Poplar-Cotton Center, Seville, Sultana, Teviston, Tooleville, Tonyville, Tract No. 51 and Waukena.

12. An anticipated substantial downward trend in agricultural employment during the 1970's, due to the inevitable and inexorable mechanization of harvesting procedures, may create serious public problems such as an increase in welfare recipiency, perpetuation of sub-standard housing and intensification of social problems of low-income farm labor communities. Such problems should be anticipated and alternative solutions provided within the framework of the Tulare County General Plan studies now in process.

13. The Three Rivers Community has, because of its fragmented and elongated growth pattern, and geological/hydrological limitations, virtually reached a point of developmental saturation. The ability of this foothill area to accommodate further population and economic expansion is at or near its peak, because of constraints imposed by natural limitations of the basin for the maintenance of acceptable domestic water quality.

ISSUES AND RECOMMENDATIONS

DEVELOPMENT

ISSUE NO. 1:

In the past, settlement in Tulare County, with its dominant agricultural orientation, tended to occur in clusters at approximately five mile intervals along major transportation routes (a comfortable distance -- some twenty to thirty minutes by horse and buggy). Twenty to thirty minutes today still seems an acceptable time separation for inter-community travel, but transportation improvements have stretched the equivalent travel distance to fifteen to thirty miles, rendering these five mile settlement nodes twentieth century anachronisms.

Settlement nodes, at more broadly spaced intervals have prospered and grown, while others within the interstices have declined and withered under differing circumstances and for varied reasons.

At the same time acceptable minimum levels of service in densely settled areas have been reasonably established and documented. Instead of provision of volunteer services, complexities of modern civilization have forced higher levels of professional services at ever rising costs. County government is held responsible for provision of these services everywhere except in incorporated cities. The county and cities faced with increasing costs and limited resources must attempt to use their financial resources in the most efficient way possible. Therefore, there is a need to evolve a "growth centers approach" to county-wide resource management and distribution. The growth centers concept involves the concentration of public resources to create, sustain and/or arrest deterioration within viable communities. Growth centers

should be identified within every sub-area of the county in order to minimize future migration problems.

We must begin by carefully examining the roles of the various communities in terms of their relative positions within a predetermined, county-wide development scheme. Subsequently, we must program sewer and water systems, housing and other public investments to reinforce these policies. For the purpose of this study a provisional assumption was used indicating that the viable communities and cities would not continue to expand horizontally and consume irreplaceable agricultural and open space lands.

In addition, reinforcing or expanding certain communities may have the effect of attracting additional private investments and may serve to relieve future growth pressures in the larger communities.

RECOMMENDATION:

1-A. It is necessary to develop an urban growth strategy geared to the orderly and efficient provision of services. Magnitude, direction and quality of growth must be influenced and channeled through the extension or retardation of public facility systems to certain areas.

1-B. A system of priorities be developed which would concentrate water and sewer system projects primarily within communities where systems already exist and where system improvement is feasible and likely to be a positive force for continued economic development. (See Recommendation 18-A for those communities which require new systems.)

1-C. Viable rural communities should be encouraged to structure their governments so they may acquire taxing authority in order to provide a full range of services.

1-D. If a rural community cannot provide urban services, the county should provide such services or assist in the formation of local service districts in order to provide county-wide service.

ISSUE NO. 2

The majority of the communities included within this study are severely limited in their ability to generate sufficient public revenue to fund improvements in services and facilities. Further, the disparity between local funding capacity and capital project costs will not be sufficiently reduced by assistance through federal and state grants to assure economic feasibility of future projects. The funding of water and/or sewer projects in some communities would so overburden residents as to threaten community economic stability, even though the community was only responsible for system operation and maintenance costs, and a minor share of original capital costs.

When viewed in a more comprehensive context, the socio/economic and environmental limitations which exist in many communities render questionable the provision of parity in corresponding housing, health care, police and fire protection, employment, education, cultural opportunities. Also other areas of human need may never be achieved, relative to the opportunities and service levels found in the larger communities of the county.

The extent of future magnitude and pattern of growth and development of these communities is indeterminate because of the uncertainty of future migration patterns, housing availability and economic activity.

In addition, the provision of water and sewer services to such communities could have the undesirable effect of permanently committing residents to a dismal future, since the goal of achieving comprehensive service and facilities parity with the larger communities is simply not possible within the foreseeable future, given the current level of governmental commitment to rural redevelopment. Correspondingly, the provision of community assets will bring with them personal advantages and opportunities.

Communities which need to be carefully studied from these aspects include Elderwood, Lindcove, Monson, Waukena, Yettem, Allensworth, Alpaugh, Delft Colony, Seville, Sultana and Teviston. These settlements have common problems of low service levels, high incidence of sub-standard housing and low economic resource base.

RECOMMENDATION:

2-A. County services and resources be provided only in areas where there are substantial community assets and prognosis for growth is favorable, so that cost of sewer and water systems and facilities will not threaten the financial stability of the community.

2-B. Communities with uncertain economic futures, which may, with assistance, improve their growth and economic potential, must be helped in the achievement of such goals by the combined efforts of more broadly developed and financially sound communities, as well as county, state and federal agencies. The county or the Association of Governments should act as the catalytic agent in securing such aid which should take the form of assistance in securing low and moderate income housing, attracting industrial and commercial development, programming for community facilities and provision of comprehensive planning.

2-C. Public resource commitments to communities with little or no authentic future should be carefully examined before final action is initiated. These non-viable communities would, as a consequence of withholding major public facilities such as sewer and water systems, enter a process of long term, natural decline as residents depart for improved opportunities in nearby communities.

ISSUE NO. 3:

Annual changes and uncertainties in migration patterns, housing availability, changing technology, and economic activities cause difficulty in functional planning for sewer and water systems. Continuing information requirements should be established which reflect a county-wide (and potentially a multi-county) approach to the analysis of the dimensions and needs of various economic sub-groups. Further, special attention to low and middle income housing requirements is imperative. Such requirements should outline the components of the information system and the assignments of responsibility needed for refining the county-wide and city housing elements during subsequent years.

RECOMMENDATION:

3-A. Both growth and decline in community populations must be monitored and evaluated on a yearly basis in order to provide a predictable planning base for community sewer and water system and other community facilities.

ISSUE NO. 4:

Need has long been evident for a definition of boundaries of settlements of urban densities, as well as protection of valuable open space lands. California legislature has, in part, recognized these problems and provided an unprecidented opportunity to implement a staged development concept with the passage of the Land Conservation Act, Open Space and Conservation Planning Law and the required Sphere of Influence concept.

RECOMMENDATION:

4-A. The delineation of "Urban parameters" or spheres of influence as identified by the Tulare County Planning Department and adopted by the Local Agency Formation Commission around districts and

communities should be adopted and used as suggested within the Urban Boundaries Study. These boundaries provide a definitive and documentable planning area within which we may explore the need to differentiate the service needs of rural and urban areas.

ISSUE NO. 5:

Regulatory accomplishment involving the distribution of available surface waters has provided benefits to the entire county, since improved efficiency in the distribution of surface supplies serves to reduce the withdrawal of groundwaters utilized for municipal and industrial purposes, as well as agricultural needs. Appropriate surface supply management therefore helps to stabilize groundwater levels at an elevation consistent with existing pumping capabilities.

The delivery of supplemental water supplies from the Friant-Kern Canal has made it possible to reduce groundwater withdrawals in canal service areas. The result has been a general stabilization in the groundwater levels in those areas.

Production capacity requirements listed in the body of this study indicate that most existing community systems will be unable to properly meet future demands. Unless supplemental quantities of water can be made economically available by one or more methods, some existing investments, such as agricultural improvements or foothill residential settlements, will be endangered, and increased agricultural and industrial water needs in the future may not be met. The proposed East Side Division of the Central Valley Project, which would convey water from the Sacramento area to the east side of the San Joaquin Valley, appears to be the only proposal to supply surface water for long range needs of Tulare County which has economic or political feasibility.

RECOMMENDATION:

5-A. It is imperative that a concentration of local and regional support be given to the East Side Division of the Central Valley Project and all possible efforts be expended to insure its earliest approval. Interim solutions are being studied which may have merit, including such facilities as the proposed Cross-Valley Canal.

ISSUE NO. 6:

Groundwater conditions in Tulare County have varied over the years, ranging from adequate to overdevelopment to inadequacy, in terms of supply necessary to meet agricultural needs. The development of centrifugal and deep well pumps, coupled with the growth of irrigated agriculture in the county, brought about extensive use of groundwater supplies. In the 1920's, the 1930's and the early 1940's, groundwater demands and withdrawals increased at an alarming rate and overdraft conditions became obvious. These overdrafts resulted in the continued lowering of groundwater levels within critical areas of extraction, with the consequence that flow rates were altered in some areas of the underground systems. Further, land subsidence occurred in scattered locations of the county as a result of these overdrafts. The policy of withdrawing groundwater in excess of replenishment cannot continue without adverse economic and environmental effects.

RECOMMENDATION:

6-A. Improved and additional groundwater recharge methods and facilities should be developed. Cessation of pumping made feasible by delivery of supplemental surface water should be instituted wherever possible. Rules and regulations should be developed by all public agencies concerned to encourage maximum conservation of water resources.

ISSUE NO. 7:

Nearly all domestic water in Tulare County is obtained from groundwater sources with the exception of those areas in, or adjacent to, the foothills or mountains.

Filtering or treatment plants are generally not required because of the moderate to excellent quality of the groundwater. Some facilities are operated when unique water quality problems exist, such as within the Allensworth area, where it is necessary to provide special filtration treatment of groundwater to remove arsenic compounds. In other areas, such as Lindsay, food processing effluents discharged to groundwaters have been held responsible for deterioration of groundwater quality and such discharge to subsurface aquifers has been discontinued. Also, in other parts of the county, future problems may arise due to the potential concentrations of agricultural wastes eminating from intensive agricultural activities migrating into the county.

The areas in proximity to the foothills generally experience inadequate groundwater yields. Additionally, the depth of the aquifers is considerably less in these areas so that the local capacity for groundwater storage is correspondingly smaller in these localities. In foothill or mountain areas adjacent to streams, surface water flows readily find their way into these limited shallow aquifers. Pumps drawing from such aquifers often deliver water which is similar in quality to the stream flow. A notable example of this occurs in the Three Rivers area where the Kaweah River is in an impaired state during certain low water periods. Wells in shallow aquifers near the river have at times produced varying levels of contamination in water intended for domestic use.

Expanding demands for water to meet existing or future community or agricultural needs in these areas represent an important concern, since native water supplies are not sufficient to meet the increased demands.

Community wells have often been developed within the county which have tapped only limited groundwater pools and hence a constant long term water supply for the community is not assured. Community water wells are acceptable only if

they are capable of delivering adequate supplies for both normal and emergency needs and can maintain such supplies in a constant dependable flow for many years.

RECOMMENDATIONS:

7-A. Growth of many of the mountain or foothill communities should be restricted to only that density which may be supported by existing water supplies, until adequate and safe surface water supplies are made available by direct delivery or through exchange.

7-B. Well logs, or other appropriate monitoring devices, of community water wells should be examined and where such logs indicate limited aquifers, the wells should be replaced or surface water supplies tapped which will correct the inadequacy.

7-C. A community water system be constructed for Three Rivers only after capital and operational costs are carefully evaluated in relation to community assets and benefits, both present and future.

ISSUE NO. 8.

In several small communities, the use of individual septic tanks and leaching fields has impaired the water quality in nearby individual wells. However, the economic condition of these communities and the feasibility of implementing programs for relocation of residents to other communities where a more optimum quality of life is available should be carefully examined before deciding to make additional public resource investments in these areas. (See Recommendation No. 7.)

RECOMMENDATION:

8-A. Community water systems be installed in the settlements of Delft Colony, Sultana, Tooleville and Tract 51 only if it is clear that there is no feasible alternative to the continued infusion of public resources into these communities, and if public health is in serious danger.

ISSUE NO. 9:

In many of the smaller communities of the county, served by independent community water and sewer systems, it is difficult to employ the necessary well-qualified personnel to maintain and operate plants and systems in an optimum and consistent manner. Perhaps the most practical solution to this problem would be for such communities to contract for services to be provided by a central entity such as the county.

RECOMMENDATIONS:

9-A. Communities should assure themselves of adequate operation and maintenance of community-wide water and sewer facilities and systems, either by the employment of well-trained and qualified personnel, or by contractual service agreements with larger local government agencies. (The county could maintain a qualified staff for the purpose of providing operational service supported completely through a contractual service agreement. An alternative to the county involvement is the formation of area-wide, county-wide, or service areas coterminous with planning areas delineated in this report or the sphere of influence as identified by the Local Agency Formation Commission.)

ISSUE NO. 10:

Water and sewer systems whould not be viewed as isolated facilities functioning independently of one another. Single purpose service districts may add unnecessary administrative costs as well as jeopardizing public health and safety through their inherent inability to coordinate the management of interrelated resources. Water and sewer service districts should not be managed by single purpose private entities whose interests do not embrace broad concerns for water basin management.

RECOMMENDATION:

10-A. The proliferation of small, private water companies and sewer service entities must be discouraged. However, if the approval of scattered or fragmented systems cannot be avoided, the city or other public governmental entity having jurisdiction within an area developed to urban density should be afforded the first right of maintenance and operation of such systems. Encourage purchase of existing small systems by cities or other public entities.

ISSUE NO. 11:

When sewer, water and other utility service lines are installed separately and in an uncoordinated fashion, newly paved streets are continually excavated and re-paved and services are disrupted, causing increased development costs and public harassment.

RECOMMENDATION:

11-A. Construction, maintenance, and operation of water and sewer facilities and systems should be coordinated for optimum utilization of public funds and resources.

ISSUE NO. 12:

Individual well systems are not generally satisfactory where urban densities occur. They are usually comparatively shallow, tapping the same unconsolidated aquifers which receive septic tank effluent, do not have capacities to provide additional flow necessary for adequate fire protection, do not allow for fluctuation in groundwater table and are an uneconomical provision of water service for concentrated development. In developing areas, such as those areas in the county included within urban boundaries as delineated by the county-wide urban parameters study, systems should be installed during initial development

of an area and should be mandated by county or municipal ordinances, which should also establish standards for large lot sizes under which individual wells may be permitted.

RECOMMENDATION:

12-A. Central community water systems should be extended in a manner which will promote orderly development and should be mandatory in urban areas.

ISSUE NO. 13:

There are areas in the county which have substantial public benefit if preserved as open space. Before protective legislative measures can be taken such lands are often lost through development for more intensive uses such as residential, commercial or industrial, and become prohibitively expensive to revert to open space.

RECOMMENDATION:

13-A. Extension or creation of central water systems and other public facilities likely to generate urban growth should be prohibited in areas where development should not occur, such as airport clear zones, primary flood plains, major aquifer recharge areas, potential public and private recreation areas, (as identified in the Environmental Resources Management Plan element of the Tulare County General Plan) predominantly agricultural areas and areas of regional, state-wide or national open space interest. Local Agency Formation Commission policy and land use tools such as Williamson Act should be used to reinforce this recommendation.

ISSUE NO. 14:

Public support of policy recommendations herein presented to increase stability of water supplies, augment county economic resources due to increased agricultural

production, population and industrial expansion is difficult to obtain unless the costs and benefits are clearly understood.

RECOMMENDATION:

14-A. A county-wide program of public education utilizing news media, mail campaigns, presentations to civic and fraternal organizations, as well as public and private agencies, should be pursued in order to ensure broad understanding of critical water-related issues.

ISSUE NO. 15:

Water system deficiencies which are present in certain systems throughout the county include the existence of sub-standard two and three inch mains, inadequate provision for enlargement or the addition of additional service connections, inadequate supply to meet minimum fire flow requirements plus maximum peak demands, and a lack of auxiliary power supply during power failures.

RECOMMENDATION:

15-A. Replace sub-standard two and three inch water mains with a minimum of four inch lines, as feasible.

15-B. Connect dead end lines with loops to provide for a complete grid system so that constant pressure and flow can be assured, as feasible.

15-C. Install larger mains or pumps in systems which were not designed for expansion or additional services.

15-D. Install water meters on services where such installation may serve to reduce waste and more efficiently use existing facilities, as feasible.

15-E. Require that all community water systems meet or exceed Tulare County minimum standards for provision of water for peak day demands and required fire flows, as feasible.

15-F. Require all systems to have standby or auxiliary power sources, as feasible.

WASTEWATER MANAGEMENT SYSTEMS

ISSUE NO. 16:

Eighteen separate wastewater treatment plants and disposal systems exist within the planning area at the present time. Several of these facilities receive industrial flows, the majority of which are related to the processing of agricultural products. Generally speaking, the majority of these wastewater facilities are in reasonably adequate condition. However, some are in imperative need of maintenance and operation improvements, and a few are in critical stages of failure. In addition, concentrations of septic tanks and other individual on-site sewage disposal systems may result in health impairment or groundwater quality degradation since, filter field soil limitations, use of individual water supply, sources in high groundwater table areas, or dense settlements may cause potential pollution hazards to be present for areas served by such disposal methods.

RECOMMENDATION:

16-A. New or greatly improved sewer systems and facilities should be constructed for Richgrove, Traver, East Orosi, Tract 92, Goshen, Poplar-Cotton Center, Lemon Cove, Terra Bella and Camp Nelson, as feasible, subject to recommendation No. 1-B concerning allocation of county resources.

17-B. Discourage installation of septic tanks through density control measures such as zoning and subdivision regulations in urban areas and those areas where the soil and groundwater conditions are inappropriate.

ISSUE NO. 17:

The conversion from septic tanks to a permanent central sewer system is extremely costly and results in interruption of many services to local residents. Such problems should be avoided, if possible, and should therefore be a prime consideration in planning developments in areas which are planned to receive a full range of urban services within a few years, such as the growth areas as identified within the text of this report, and peripheral urban areas as defined by the current Sphere of Influence and Urban Boundary studies.

RECOMMENDATION:

17-A. Central sewers should be installed in all areas where urban densities occur except those permanently committed to large parcel development (agriculture or open space and recreational uses). All trunk and lateral systems should be installed during initial development of an area. Central sewers should be phased to promote orderly and economic development.

17-B. Developers should be required to install dry line sewers in those areas where individual sewage disposal systems are intended as an interim solution.

17-C. In urban areas not yet served by community systems acceptable community sewer systems serviced by packaged treatment plants should be permitted. However, initial developers and subsequent owners must be required to guarantee continuous and perpetual maintenance of these isolated systems. Central cities should also be provided first right of maintenance of those systems within their sphere of influence. The design concept should render the system capable of connection to the central community system when feasible.

17-D. <u>In urban areas where central systems are not available, sewer "stub-outs" should be required in order to facilitate connection to future community system.</u>

<u>ISSUE NO. 18</u>:

In the past, lack of firm and documentable development policies (relating to systems location) by both the State Regional Water Quality Control Board and the county have allowed scatteration of urban densities in small clusters which have created a high cost of facilities and service and resulted in maintenance and operation problems. Hence, some sewage treatment facilities have been inevitably located in areas of high groundwater levels, flood prone areas and other locations poorly situated in relation to urban settlements. Public health, safety, and welfare have been jeopardized.

A large part of the economy of Tulare County is directly dependent on agricultural production. Unfortunately development has not occurred in a solid thrust around the central cities as residential, industrial, and commercial developments, (through the use of on-site sewage disposal facilities) have been built miles from previously existing development and, in the process, large acreages of vacant land have been left between the new developments, rendering them targets for land speculation as well as threatening their agricultural integrity.

Tulare County is now engaged in an assessment of general planning process and developing growth policies which should provide reasonable solutions to the scatteration problem. The Urban Boundaries study will develop urban boundary limits for all settlements in the county which will confine urban densities within established and agreed upon demarcations surrounding existing communities. Joint county-city sewer and water policies have been adopted to reinforce this concept by the Tulare County Association of Governments.

RECOMMENDATION:

18-A. Local communities as well as the county, should utilize such tools as utility extension policies, protective open space zoning and ordinances requiring that all new urban development be connected to community water and sewer systems to channel new growth into more desirable patterns of development.

18-B. Treatment works should be located so that they are functionally and aesthetically compatible with the adjacent environment and with proposed development. They should not be located in flood prone areas or, if this is not feasible, terminal facilities should be floodproofed.

ISSUE NO. 19:

With the exception of Lindsay, the design concepts for all of the recommended systems are predicated on the assumption that most industrial wastewaters will ultimately be discharged into municipal systems. Unfortunately, industrial wastewaters have not always been treated at the source, although this is recommended to lessen strains on municipal treatment plants.

RECOMMENDATION:

19-A. In order that municipal treatment plants not receive constituents they are not able to properly treat, communities receiving industrial wastewaters should consider adoption of wastewater discharge ordinances prescribing pretreatment at the source and including limiting parameters for average daily flow, biochemical oxygen demand, suspended solids, acidity, grease content, toxic substances and other types of waste which are not economically treatable in municipal systems.

ISSUE NO. 20:

The community of Three Rivers is in need of a community sewer system which will assure its residents a safe water supply and provide for additional growth. However, investigation indicates that capital and maintenance costs, even if maximum feasible federal and state assistance could be obtained, may prove to be an intolerable financial burden to the community.

RECOMMENDATION:

20-A. A community sewer system be constructed for Three Rivers only after capital and maintenance costs are carefully evaluated in relation to community assets and benefits, both present and future.

WATER SUPPLY PLAN

It is expected that in the foreseeable future, all valley communities and districts will continue to obtain water supplies from groundwater sources. Supplies to meet the needs of communities located in proximity to the foothills, such as the cities of Woodlake and Lindsay, are anticipated to eminate from a combination of groundwater and imported supplemental surface water. These assumptions are based on a growing confidence that the existing quality of groundwater will be maintained above the minimum standards established by public health authorities.

In order to maintain groundwater of proper quality at feasible pumping depths, it will be necessary to bring additional supplemental surface water supplies into Tulare County. Through management and conjunctive use of surface and groundwaters, it will then be possible to make use of the large groundwater storage capacity underlying Tulare County.

Capital costs proposed in this study for development and improvement of community water systems total $6,283,600 for the 1972-80 period and $2,321,000 for the 1980-90 period. The monies recommended to be appropriated for the 1972-80 period are considerably greater than for the 1980-90 period because they reflect the backlog of work necessary to bring facilities up to contemporary minimum standards; 1980-1990 forecasts represent the need for additional facilities and modifications to meet the demands of anticipated growth.

WASTEWATER MANAGEMENT PLAN

The wastewater management plan recommended for Tulare County was designed to achieve the following objectives: (1) protection of public health, (2) provision for a balance of natural resources, and (3) enhancement of ability to reclaim water resources.

Although most existing disposal systems achieve reclamation of wastewaters via direct percolation to the groundwater system or through a more diffused return by irrigation of agricultural lands undesirable constituents are being discharged to the groundwater system of the county because of the present limitations of the degree of available treatment. Continued protection of the groundwater resource may be partially achieved by reducing the number of treated wastewater locations and by accomplishing more advanced treatment methodology in selected locations. Further, economy of scale in the construction of sophisticated treatment facilities may often be achieved by consolidating systems.

In order to achieve the objectives outlined above, the Tulare County Wastewater Management Plan recommends the construction of three joint projects, listed below, involving seventeen communities and a brief description of each project, the construction of collection and treatment facilities for several areas in which the use of individual septic tanks is posing a potential threat to the quality of the groundwater and to the health of the community. Further, three alternative plans are presented for the provision of sewerage facilities for the Three Rivers area. The Wastewater Management Plan is shown on Figure VIII-2. Table IX-2 lists the recommended projects, a brief description of the project, recommended period of construction, and the estimated initial capital costs providing the recommended facilities.

Capital costs proposed for the development, consolidation, and improvement of community sewer systems total $21,123,000 for the 1972-80 period and $4,630,000 for the 1980-90 period. Again, the expenditures for the 1972-80 period are necessary to provide minimum standards of protection of public health and safety for residents of Tulare County, while 1980-1990 expenditures provide facilities and modifications to supply service for forecasted growth.

> Joint Project No. 1, including the existing Cutler-Orosi treatment facilities as the treatment plant site, envisions collection and treatment of wastewaters from Cutler, East Orosi, Midway and Orosi. (This project is now underway)
>
> Joint Project No. 2, designates the City of Visalia treatment plant as a regional wastewater treatment facility for the communities of Exeter, Farmersville, Goshen, Linnell Farm Center, Oak Ranch, Patterson Tract, Tooleville, Visalia, and Tract 92.
>
> Joint Project No. 3, expands the existing Woodville treatment facility and treats flows there from Woodville, Woodville Farm Center, Cotton Center and Poplar.

When construction of the proposed San Joaquin Master Drain Project is completed, a possible method of disposal for some non-reclaimable wastewaters may be provided. The greater build-up of nitrates due to more arable land being put into production in the valley may pose a threat to valuable agricultural lands as well as to the quality of the groundwater and thus the Drain Project was conceived. Some excess capacity is anticipated for high nitrate content wastewaters which are generated by non-agricultural uses.

CHAPTER ONE

INTRODUCTION

CHAPTER I

INTRODUCTION

NEED FOR THE STUDY

Due to the significant demands on present water supplies in Tulare County, and in light of future growth, this study was undertaken to determine the water supply and sewerage facilities necessary to (1) meet the requirements of expanding population and industry within the area, (2) protect the public health, and (3) prevent degradation of the underground water resources.

AUTHORIZATION

With the financial assistance of a grant from the Farmers Home Administration, United States Department of Agriculture, the Tulare County Planning Commission entered into a contract for the program with the Planning-Engineering Consortium of Grunwald, Crawford and Associates, Engineering-Science, Inc., and James F. Sorensen, on 2 February 1970.

OBJECTIVE AND SCOPE OF THE STUDY

The objective of the study was the preparation of comprehensive county-wide plans for water supply and wastewater management to meet both the short and long-range needs of communities in Tulare County including the identification and recommendation of system improvements and methods of financing.

ACKNOWLEDGEMENTS

The program was substantially assisted by the cooperation and contributions of the several staff members of the participating cities and communities. The Tulare County Planning Department, directed by Mr. Donald Woolfe, provided basic direction of the study, much of the data, information, graphics and final editing and printing.

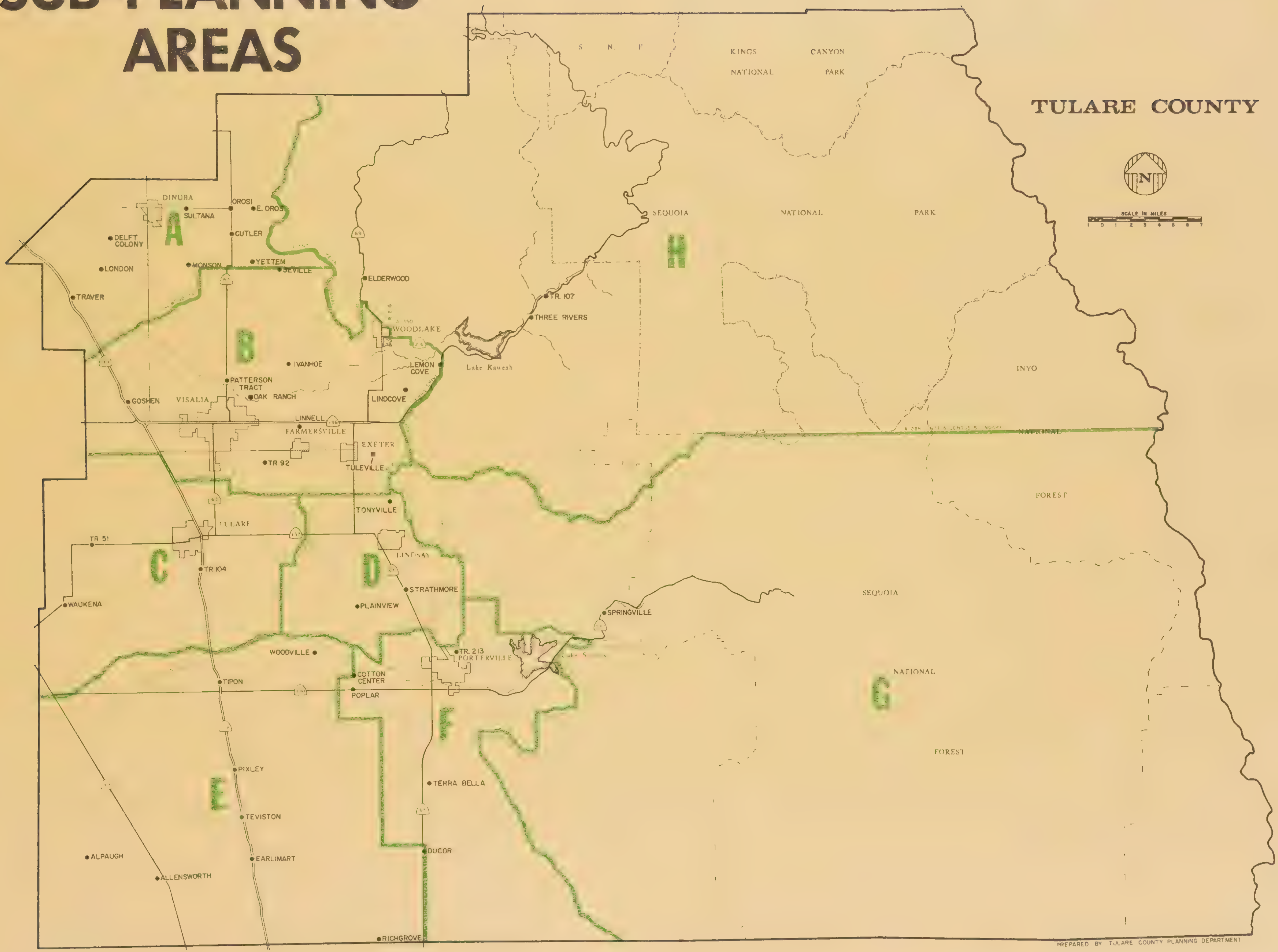
The basic data for this report was obtained from many sources. The Consortium wishes to express its deep appreciation to the many individuals and agencies for the valuable information provided and their willing cooperation during the course of the study.

CHAPTER TWO

PLANNING AREA AND DEVELOPMENT FACTORS

SUB-PLANNING AREAS

Fig. II-1



CHAPTER II

PLANNING AREA AND DEVELOPMENT FACTORS

INTRODUCTION

This chapter describes those factors which act to influence the future physical, economic and social character of communities in relation to the planning and development of water and sewer facilities.

SUB-PLANNING AREAS OF THE COUNTY

Eight sub-planning areas were delineated early in the study to provide a framework for the discussion of problems common to two or more communities. The eight areas are shown in Figure II-1 and may be described generally as follows:

1. Area "A" - Dinuba Area: This area embraces generally the northwestern part of the county lying on the valley floor and includes the city of Dinuba and the unincorporated communities of Traver, London, Delft Colony, Sultana, Orosi, Cutler, East Orosi, Monson, Yettem and Seville.
2. Area "B" - Visalia-Woodlake Area: This area embraces generally the north-central part of the county lying on the valley floor and includes the cities of Visalia, Woodlake, Exeter and Farmersville, and the unincorporated communities of Elderwood, Lindcove, Goshen, Patterson Tract, Ivanhoe, Oak Ranch, Lemon Cove, Linnell, Tract 92 and Tooleville.
3. Area "C" - Tulare Area: This area embraces generally the west-central part of the county lying on the valley floor and includes

the City of Tulare and the unincorporated communities of Waukena, Tract 51 and Tract 104.

4. <u>Area "D" - Lindsay Area</u>: This area embraces generally the east-central part of the county lying on the valley floor and includes the City of Lindsay and the unincorporated communities of Tonyville, Strathmore and Plainview.

5. <u>Area "E" - Tipton-Earlimart Area</u>: This area embraces generally the southwestern part of the county lying on the valley floor south of the Tule River and includes the unincorporated communities of Woodville, Tipton, Allensworth, Alpaugh, Earlimart, Pixley and Teviston.

6. <u>Area "F" - Porterville Area</u>: This area embraces generally the remaining valley floor area of the county and includes the City of Porterville and the unincorporated communities of Richgrove, Ducor, Terra Bella, Poplar, Cotton Center and Tract 213.

7. <u>Area "G" - Southeast Foothill-Sierra Area</u>: This area embraces generally the foothill and mountain area of the county within the Tule River watershed and includes the unincorporated communities of Springville and Camp Nelson.

8. <u>Area "H" - Northeast Foothill-Sierra Area</u>: This area embraces generally the foothill and mountain area of the county within the Kaweah River watershed and includes the unincorporated communities of Three Rivers and Tract 107.

Factors used in delineating the sub-planning areas included the influence of supervisorial districts, water districts, school districts, agricultural character, irrigation districts, the boundaries of enumeration districts used in the 1970 Census, and factors of geographic independence and economic interdependence of communities and the surrounding rural area. The sub-planning areas are shown in Figure II-1.

SUB-PLANNING AREA AND COMMUNITY PROFILES

The report is divided into a series of chapters describing the physical, economic and social conditions within each sub-planning area and its communities. A general description for each sub-planning area is followed by a tabular profile of factors which are important to the development of population projections and conclusions concerning future growth and development potential of individual communities.

Community Profiles

While every community within a given sub-planning area has characteristics which distinguish it from other communities, there are also a sufficient number of similarities which permit communities to be classified with respect to their dominant characteristics. Accordingly, six classifications were developed for ease of reference and analysis which permit distinction among communities of the same class as well as distinction among communities within different classifications. The six classifications are described below because of their relevance to understanding the description of planning and development factors in each sub-planning area and to population and economic projections provided in Chapter III.

The Farm Labor Residential Community

Communities in this class may range in population from under 100 to more than 500, and in most cases were originally established to provide inexpensive housing for families who derived their income from farm labor. In a few cases, communities were once viable economic entities which have undergone considerable transition as the economic factors which were responsible originally for their creation have either become a part of history or else have shifted in favor of larger communities. More often the farm labor residential community developed as an inadequate response to the need for housing the poor and low-income segments of the population at a time when the plight of thousands of farm workers

was neither a matter of general public concern, public conscience, nor public debate.

Such communities are really not communities at all in the normal understanding of the term. Rather, they are collections of housing units which sprung up on the land with little regard for the quality of life which would be afforded the residents. Physically, many such communities began as subdivided tracts before the development of adequate subdivision standards, or as a collection of metes and bounds land divisions, often in locations considerably remote from the more important urban areas of the county.

Characteristics of the farm labor residential community which are generally common to the classification are:

1. A high percentage of substandard housing.
2. A low level of environmental quality, poor maintenance, little or no vegetative cover, poor condition of streets, unproductive soils, remote and uninteresting setting, etc.
3. A gross lack (both in terms of type and quality) in the range of public and private services and facilities required for healthful living.
4. A low level of personal and family income.
5. A low assessed valuation.
6. A high incidence of public welfare assistance.
7. Poverty.
8. Lack of employment opportunity.
9. Low educational attainment.

In short, the farm labor residential community lacks both visible and statistical evidence of future economic opportunity and viability, and poses serious problems and obstacles to formulating means to improve substantially the quality of life for the majority of the population involved.

The Minor Rural Service Center

Communities in this class differ from the farm labor residential community primarily on the basis of their economic role, and are placed in this category primarily because of service role to the surrounding area. Size is not a decisive factor. Minor rural service centers may either be centered about an industry (e.g., fruit packing and shipping) or a few retail and commercial service operations -- or both. They tend to be the rural equivalent of the "corner store" area within neighborhoods of larger communities -- a place to obtain groceries, feed, gasoline and repair services convenient to the surrounding rural population in the immediate area. Regardless of the major services offered, minor rural service centers often are located along important county roads and highways and exhibit a "cross-roads" character. Depending on the vitality of industrial or commercial operations, housing most often followed business development, on a modest scale, over many years.

The economic vitality and, therefore, future role of the minor rural service center is generally in doubt because the diminishing size of the rural farm population has correspondingly reduced the economic support for the center. In some communities this support has been reduced to the point where retail and service enterprises are hard-pressed to remain in business. Only established businesses are likely to remain for any period of time. Even then economic pressures are likely to increasingly force relocation to a larger community or the closing of the business. The long-term survival of agriculturally-related industries located in such centers may also be in jeopardy as the result of technological and competitive factors which insist on major new investment and, therefore, relocation to a larger community where more stable economic conditions are likely to prevail.

Minor rural service centers tend to be the location of elementary school and postal facilities. Housing tends to be of better quality than that found in

the farm labor residential community. And, community interest is often stronger because of historic background. However, since there are few other differences, each minor rural center must be examined separately if its most logical future role (continuation, decline or disappearance) is to be properly diagnosed.

The Major Rural Service Center

Communities in this class may range from under 1,000 to more than 3,000. In addition to population size, they are distinguished from the two previously described centers primarily because they provide a more full range of services and facilities, have some employment base in addition to that provided directly by surrounding areas of agricultural production, and have roots in the historic development of the surrounding area which they serve.

The economic vitality of major rural service centers is generally sufficient to assure their continued existence. It should be noted, however, that population increase in some major centers may actually be due more to the decline of opportunity in minor rural centers and lack of opportunity in farm labor centers than because of new opportunities for employment in the major centers. As population continues to shift from rural to urban and from the smaller center to the major center, opportunities may decline in inverse proportion to population increase unless employment and improved housing opportunity accompanies such increase.

As compared to most municipalities in the county, the major rural service center exhibits higher degrees of sub-standard housing and fewer opportunities for employment and the pursuit of cultural activities. Such differences, however, may be minor to many people in the major rural center because of a strong desire to live in a less complicated environment. It should be noted that several major rural centers are sufficiently large in area and popula-

tion, and sufficiently stable in economic activity, income and assessed valuation to warrant consideration of municipal status to obtain improvement in the quality of life afforded residents.

The Municipality

Four cities are included in the county-wide water and sewer study, ranging in population from approximately 3,371 (Woodlake) to 5,400 (Lindsay). Each city provides a generally more complete range of services, facilities and opportunities than are to be found in unincorporated major rural service centers. The four cities generally serve as the primary centers for retail trade of a convenience nature for the surrounding smaller centers and farm population. But in all cases the four cities are dominated economically by the larger municipal trade centers of the county.

The Unincorporated Residential Tract

The unincorporated residential tract is mainly the product of "leap-frogging" (noncontiguous land development) and premature expansion of the larger urban areas of the county, and there is considerable variation in size. They are substantially different in character from other urban centers in that they are composed almost entirely (in most cases exclusively) of housing units. Residential tracts are found close to, but outside of, the urban expansion areas of the cities and between cities. While some tracts were developed at the time when county subdivision standards were inadequate, many tracts are well improved. Mostly sound housing and lack of a sewer system are characteristics common to most tracts. Other characteristics include an agricultural setting and a desire by residents to be free of the congestion of the county's larger urban areas, while having access to the benefits of those urban areas through close proximity. Some tracts will eventually be absorbed by the expansion of larger urban areas, but others will remain separate from such expansion for many decades.

The Recreation-Oriented and Retirement Community

Communities which are attractive because of their recreation and retirement orientation are located within the foothill and mountain sub-planning areas of the county. Communities of this class are generally under 1,000 in population, but the more active may reach several thousand in population during the planning period of the water and sewer study.

As would be expected by the classification applied, such communities have attractive physical settings, a high incidence of good quality housing, and relatively high income levels. Because of the growing second home and retirement market, the mountain, reservoir and foothill areas of Tulare County have already shown substantial growth (and strain) from urban development of this type. Not only are established communities of this class experiencing expansionary pressure, but entirely new communities are on the drawing boards to meet the state-wide market for recreation-oriented and retirement living.

A primary concern of the county-wide water and sewer study must be the need for adequate means of maintaining water quality in foothill and mountain areas through improved and new programs of water supply and sewage disposal. The more fragile character of the foothill and mountain environment (as compared to the valley floor), when coupled with demands for urbanization in that environment, insists that urbanization in established and new communities be made compatible with the very qualities and amenities of the natural environment which attract population growth and development activity; if not, the initial reason for their popularity will inevitably be destroyed.

Fig. II-2

SUB-PLANNING AREAS A & B

DINUBA-VISALIA-WOODLAKE

LEGEND

	"A" TOTAL	"B" TOTAL
HOSPITAL	1	3
NURSING HOME OR CONVALESCENT HOSPITAL	3	4
HEALTH DEPARTMENT OR CLINIC	4	5
SCHOOL	14	55
(2) NUMBER OF FACILITIES		

PREPARED BY: TULARE COUNTY PLANNING DEPARTMENT

THE DINUBA SUB-PLANNING AREA

Physical Factors

Physical factors and the relationship of communities within the Dinuba sub-planning area are shown generally in Figure II-2. Land use in this area is primarily devoted to agriculture. Vineyards and orchards dominate the agricultural land pattern in the northern part of the area as the southern-most extension of the vast acreage devoted to such permanent crops in south-central Fresno County. The soils in this area are mostly Class I and Class II in character -- they are deep, nearly level and have little or no tendency to erode. The sub-planning area contains the second-largest concentration of Class I soils within the County. In contrast, soils in the southern-most part of the area are of the Class VI type. These soils are shallow, highly alkaline and susceptible to erosion, and as a consequence are devoted mostly to pasture. Much of this land remains in an open, uncultivated state.

Under the California Land Conservation Act, a substantial part of the agricultural land is in agricultural preserves. Thirty-five percent of the land within a two mile radius of the City of Dinuba is presently in this classification lying mostly north and south of the City. Forty-five percent of the land adjacent to Cutler-Orosi is in agricultural preserves although an extensive corridor along Highway 63 is unprotected. In selected locations throughout the Dinuba sub-planning area concentrations of 35-80% of the land is in such preserves, with high concentration in the foothills northeast of Dinuba, Orosi and Cutler, where 85% of the land is under contract.

Urban areas included in the water and sewer study are clustered within the high value crop areas south and east of the City of Dinuba. They include the unincorporated communities of Traver, London, Monson, Sultana, Yettem, Cutler-Orosi, East Orosi, and Seville. The amount of area devoted to major categories of land use in these communities is shown in Table II-1 (Last of Chapter).

Principal transportation facilities are (1) State Highway 99 along the western edge of the sub-planning area; (2) State Highway 201 providing east-west access between the most populous communities; (3) State Highway 63 connecting the Cutler-Orosi area with the more populated urban centers of central Tulare County; (4) Avenue 416 connecting Orosi with Caruthers in Fresno County; and (5) Road 80 connecting the Dinuba area with State Highway 198 near the Visalia Airport on the south and extending north into the Reedley area of Fresno County.

The mainline of the Southern Pacific Railroad runs parallel with State Highway 99 and provides freight service at the community of Traver. A Southern Pacific spur track services the communities of Dinuba and Monson, while a split spur of the Santa Fe services the communities of Sultana, Cutler, East Orosi and Seville. Both the Southern Pacific and Santa Fe spurs enter the sub-planning area from Fresno County and continue southerly serving other communities of the county before rejoining mainline trackage in Kern County (Southern Pacific) and Kings County (Santa Fe). A private airport is located two miles east of Sultana.

The dominant resource factors affecting the Dinuba sub-planning area are (1) the Kings River and its flood plain along the northwestern boundary; (2) the Friant-Kern Canal, Sand Creek and the Sierra foothills along the eastern boundary; (3) Cross Creek along the southern boundary; and (4) a highly developed system of irrigation canals maintained by the Alta Irrigation District. The creek, river and canal systems have caused extensive flooding during years of heavy runoff, particularly in the Dinuba, Cutler-Orosi, East Orosi, Yettem and Seville parts of the sub-planning area. Extensive flooding has also occurred along Cross Creek, but has not affected communities. Heavy flooding in the Dinuba area during the spring of 1969 was caused by a major break in the Alta Canal north of the city.

Economic and Social Factors

The economy of the Dinuba sub-planning area is heavily dependent on agriculture. The diversified pattern of agricultural activities and the early pattern of water distribution facilities is largely responsible for the clustered pattern of communities. In addition to grape, deciduous fruit and citrus production, the poultry industry is a major component of agricultural production. The Dinuba area has become a center for turkey raising and processing.

The level of personal income within the area is relatively low (42% under $3,000 per year) because of the heavy dependence on hand picking of grape, fruit and citrus crops in the area. Correspondingly, the area has a high percentage of the population which is of Mexican descent who are engaged in farm labor. Uncertainties in the market for wine and raisin grapes over the past decade, with occasional severe fluctuations in the price paid to the grower, continues to plague the grape industry and, therefore, points up the importance of obtaining greater diversity in employment if unemployment rates are to drop and personal income rise.

Fruit packing and canning operations comprise a high percentage of non-agricultural employment in the area, with most operations concentrated in the Dinuba and Cutler-Orosi areas. Figures compiled by the Tulare County Chamber of Commerce in 1970 indicate 12 such establishments in Dinuba with an employed force ranging from approximately 250 to more than 1,300 on a seasonal basis. In the Cutler-Orosi area there are 16 such establishments with approximately 1,100 employees on a seasonal basis. A few other packing operations are located along railroad spurs in the rural area.

A PROFILE OF COMMUNITIES IN THE DINUBA SUB-PLANNING AREA

Three of the six classifications of communities described previously apply to

communities within the Dinuba sub-planning area. A profile of social, economic and physical factors is shown in Table II-2.

Farm Labor Residential Communities

Communities in the farm labor residential community classification are Traver, London, Delft Colony, East Orosi, Seville and Yettem. Of these five communities, London has been stabilized by (1) investment in permanent low-rent housing during the past decade by the Tulare County Housing Authority, (2) the creation of the London Community Services District to provide sewage treatment in 1968, (3) central water supply. It may well increase in population as the result of a population shift from smaller centers in the sub-planning area.

The marked shift in the characteristics of the population in Yettem has also changed the character of this historically Armenian farm community. Housing quality has declined and the community generally has taken on more of the physical, economic and social characteristics of the farm labor residential community.

Minor Rural Service Centers

Communities included in this classification are Sultana and Monson. Competition from the Dinuba and Cutler-Orosi areas is expected to cause continuing decline in these minor centers.

Major Rural Service Centers

Orosi and Cutler are the only communities in this class. Because of their close physical proximity and a combined population of more than 5,200, the two communities are discussed here as a single major center -- the largest rural service center of the county.

The Cutler-Orosi center was identified during the county-wide area general plan program in 1963 as one of the six major rural service centers requiring intensive planning analysis because of its location, growth patterns and growth potential. Since 1960 the center has shown a population growth of more than 2,000 -- a substantial increase of nearly 62% -- marking it as the fastest growing unincorporated urban area of the county. Individually, Cutler and Orosi increased by 14.2% and 163.1% respectively, thus indicating that Orosi has experienced the most dynamic changes. With agricultural preserves established on three sides of both communities (limiting land use to exclusive agricultural activities), land between these communities will become the primary target for urban expansion, reinforcing the view that the two communities should be treated as one for planning purposes and that consideration be given to obtaining municipal status for the combined urban area.

TABLE II-2

PROFILE OF COMMUNITIES IN THE DINUBA SUB-PLANNING AREA

	SOCIAL FACTORS				ECONOMIC FACTORS			PHYSICAL FACTORS										
COMMUNITY	POPULATION 1960	1970	Dominant Minority Other Than White	% Sub-standard Housing	% Family Income Under $3,000	Adequacy of Local Employment Base	Assessed Valuation ($000's)	** Environmental Quality	Water	Sewer	Elementary School	Fire	Streets	Library	Flood Prone	Primary Soil Class	Accessibility Major Urban Center	Expansion Affected by Agricultural Preserves
Traver	350	374	Mexican-American	91.4	29.1	Poor	85.5	Poor	Yes	No	Yes	No	Fair	No	Yes	VI	Good	High
London	N.A.*	708	--	70.2	39.9	Poor	171.7	Poor	Yes	Yes	No	Yes	Fair	No	No	I	Fair	Low
Delft Colony	N.A.	428	--	79.7	39.9	Poor	74.4	Poor	No	No	Yes	No	Fair	No	No	I	Fair	Low
Sultana	N.A.	325	Mexican-American	76.7	59.1	Fair	100.7	Poor	No	No	Yes	No	Fair	No	Yes	II	Good	Medium
Orosi	1,048	2,757	Mexican-American & Oriental	59.2	41.7	Good	1,680.1	Fair-Good	Yes	Yes	Yes	Yes	Fair	Yes	Yes	II		Medium
Cutler	2,191	2,503	Mexican-American	82.7	41.7	Fair	1,067.5	Poor	Yes	Yes	Yes	No	Fair	No	Yes	VI		Medium
East Orosi	N.A.	100	--	63.3	41.7	Poor	N.A.	Poor	Yes	No	No	No	Fair	No	Yes	II	Good	Medium
Monson	N.A.	100	Mexican-American	83.3	N.A.	Poor	28.4	Poor	No	No	Yes	No	Fair	No	Yes	VI	Good	Low
Yettem	N.A.	354	Mexican-American	90.6	55.4	Poor	55.7	Poor	Yes	Yes	Yes	No	Poor	No	Yes	II	Good	High
Seville	N.A.	225	Mexican-American	98.9	N.A.	Poor	40.3	Poor	Yes	No	Yes	No	Poor	No	Yes	II	Good	Medium
Cutler-Orosi	3,239	5,260	Mexican-American & Oriental	67.6	41.7	Fair-Good	2,747.8	Fair	Yes	Yes	Yes	Yes	Fair	Yes	Yes	II & IV		Medium

* Indicates not available.
** High % substandard housing, sparse vegetative cover, poor streets, unproductive soils, lack of services, cultural opportunities.

THE VISALIA-WOODLAKE SUB-PLANNING AREA

Physical Factors

The Physical character of the Visalia-Woodlake Sub-Planning Area has great variation (see Figure II-2). The area includes the largest and most highly developed urban center of the county (Visalia) as well as some of the smallest centers; agricultural land patterns range from open and grazing land (central), to citrus (northeast and southeast), and to dairy, pasture and field crop areas (south and west).

In the vicinity of Visalia, land held in agricultural preserves is a reflection of probabilities of immediate versus long range urban development. Thus the areas near Highway 198 and Mooney Boulevard contain very little agricultural preserve land, while percentages increase as distance until one and one-half to two miles away from urban concentrations holdings include 50-55% of available lands. Around Woodlake, the same patterns hold true except that rural percentages rise to 60-70% in agricultural preserves excluding several thousand acres bordering the Kaweah River below the Lake Kaweah dam.

Farmersville shows a gradual transition area of urban uses to rural uses by a three mile band whose perimeter shows 40-50% agricultural preserve land. Woodlake, however, begins this heavy concentration within one-half to one mile of the city limits. The same is true of the Exeter area with the exception of a well-defined two mile wide corridor along the east foothill ridge bordering the Yokohl Valley. It is difficult to surmise the reason for this omission; the east slopes are highly developed in citrus and vineyard holding with the east slopes mostly open rangelands.

Over the sub-planning area as a whole, a checkerboard pattern (possibly a result of smaller land ownership parcels) is evident on the valley floor,

resulting in 40-50% agricultural preserve designations; in the foothill areas, holdings rise to 70-80%, a much more solid block, where larger holdings are common.

The area surrounding Visalia along the alluvial fan of the Kaweah River and its tributary stream group has the largest acreage of Class I, prime agricultural soil, of any sub-planning area of the county. (1) Only the most western soils are of marginal character (Class VI) and then mainly because of historic flooding and soil erosion from the St. John's River and Cross Creek. Even then, many thousands of acres have been reclaimed through careful farm management practices. All urban areas are clustered along the Kaweah River Delta fan east of Visalia, with the exception of Goshen. They include the cities of Farmersville, Exeter and Woodlake, and the unincorporated communities of Ivanhoe and Lemon Cove. In addition, there are a number of scattered residential tracts and housing areas which are treated separately in this report because of the concentration of housing units involved. The amount of land devoted to major categories of urban use in these communities is shown in Table II-3.

Principal highway transportation facilities include:

1. Freeway 99 along the western edge of the sub-planning area;
2. Freeway 198, the major east-west highway through the center of the sub-planning area and the primary highway link between Tulare and Kings counties;
3. State Highway 63, linking the Visalia area with the City of Tulare to the south and the Cutler-Orosi area to the north;
4. State Highway 216, linking the Visalia area with Ivanhoe and Woodlake to the northeast;

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(1) Agricultural classifications used by the U.S. Department of Agriculture, Soil Conservation Service.

TABLE II-3

URBAN LAND USE IN THE VISALIA-WOODLAKE AREA, 1970[1]

COMMUNITY PLANNING AREA	MAJOR LAND USE CATEGORIES				
	Residential	Commercial	Industrial	Public	Sub-Total Developed[2]
Elderwood	15.5	1.5	3.0	4.0	24.0
Woodlake[3]	289.9	34.3	14.5	119.2	457.9
Lindcove	33.5	0.5	0.0	77.0	111.0
Goshen	127.5	20.3	75.4	59.3	282.5
Patterson Tract	108.0	5.0	42.0	155.0	305.0
Ivanhoe	190.0	15.0	40.0	38.0	283.0
Oak Ranch	30.0	0.0	0.0	48.0	78.0
Lemon Cove	29.5	1.5	4.5	7.0	42.5
Exeter[3]	342.0	43.5	57.5	85.5	528.5
Farmersville[3]	204.0	24.0	16.5	27.5	272.0
Tract 92	48.0	0.3	2.5	0.0	50.8
Tooleville	23.5	2.8	0.0	0.3	26.6

(1) Derived from data provided by the staff of the Tulare County Planning Department.

(2) Excluding streets, roads and vacant lands.

(3) Incorporated cities.

5. State Highway 65 along the eastern boundary of the sub-planning area; and
6. State Highway 69 connecting the Woodlake area with State Highway 180 in Fresno County near Pinehurst.

Major county roads serving community and farm areas of the planning area include Avenue 304, Avenue 280, Road 80, Road 164, Road 168 and Road 204.

The mainline Southern Pacific Railroad parallels Freeway 99 and Southern Pacific and Santa Fe rail spurs connect major urban areas, extending south from the Dinuba sub-planning area. The Visalia Airport is the largest airport in the county and the only airport providing commercial air passenger service. Other airports are located at North Visalia and Woodlake.

The dominant resource factors affecting the sub-planning area are the Kaweah River and its tributary stream group, the valley oak forest area in the Cameron Creek area east of Visalia, extensive acreages of Class I and II soils, a highly developed system of irrigation canals, high water table and flood plain areas in the Kaweah River Delta, extensive acreages devoted to permanent orchard crops, and a generally excellent physical setting at an important gateway to the national forest and park areas of the Sierra.

The City of Woodlake experienced extensive flooding during 1969 from Antelope Creek. The largest areas affected by the 1969 flood are between Exeter and Woodlake and along Cottonwood and Cross Creek away from urban centers.

Economic and Social Factors

Economic and social factors within the sub-planning area are as varied as the physical factors described above. The sub-planning area contains the greatest number of people and manufacturing industries, and the highest level of manufacturing employment within the county while also employing

thousands of people in farm labor. Personal income ranges from considerable wealth to poverty, with most families in the middle-income range for the county as a whole. Housing conditions range from large concentrations of high-value homes to large concentrations of sub-standard housing. Manufacturing industries are concentrated in the Visalia area. This concentration includes 62 industries which are not related to agriculture, involving 27 major categories of industrial production. The Visalia area has experienced the greatest expansion of non-agriculturally oriented industries relative to urban area population of any city or metropolitan area of the San Joaquin Valley. In addition, the Visalia area has 18 other industries whose activities are related to agriculture. Total industrial employment as reported by the Tulare County Chamber of Commerce in 1970 exceeded 3,600 employees, including peak seasonal employment within food packing and processing industries.

For its size, Woodlake has a surprising number of industries, with 19 industries involved in manufacturing and 16 related to agriculture. The total peak annual employment exceeds 700. Food packing and processing accounts for the largest concentration of employment.

As an important center for citrus production and shipping, Exeter has more than 30 industries related to agriculture and an additional 16 industries involved in various forms of manufacturing and service activities. Industrial activity in the Farmersville area is negligible, which accounts for lower levels of family income than are to be found in the other three cities within the sub-planning area.

The diversity of agricultural and manufacturing activity within the sub-planning area accounts for its overall high level of economic stability as compared to other sub-planning areas of the county. Only the Porterville

sub-planning area comes anywhere close to achieving the same level of economic stability.

As the most populated sub-planning area, the Visalia-Woodlake area also affords diversity in the range of cultural and recreational pursuits available to the population. Since all communities are within easy driving distance of the Visalia Urban Area, such opportunities are also available to residents of the smaller cities and unincorporated communities. The College of the Sequoias at Visalia serves a two-county (including Kings) area. Visalia is also the seat of county government and over-the-counter services provided by the county are more readily accessible to the people in the sub-planning area.

TABLE II-4

PROFILE OF COMMUNITIES IN THE VISALIA-WOODLAKE SUB-PLANNING AREA

	SOCIAL FACTORS				ECONOMIC FACTORS			PHYSICAL FACTORS										
COMMUNITY	POPULATION 1960	POPULATION 1970	Dominant Minority Other Than White	% Sub-standard Housing	Family Income Under $3,000	Adequacy of Local Employment	Assessed Valuation ($000's)	*** Environmental Quality	Water	Sewer	Elementary School	Fire	Streets	Library	Flood Prone	Primary Soil Class	Accessibility Major Urban Center	Expansion Affected by Agricultural Preserves
Elderwood	N.A.	241		48.0	N.A.	Poor	56.8	Good	No	No	Yes	No	Fair	No	Yes	II	Good	High
Woodlake*	2,623	3,371	Mexican-American	78.8	37.8	Good	2,098.1	Good	Yes	Yes	Yes	Yes	Good	Yes	Yes	II	Good	Medium
Lindcove	N.A.**	147		66.0	N.A.	Poor	32.5	Fair	No	No	No	No	Fair	No	No	II	Fair	Medium
Goshen	1,061	1,324		62.2	50.3	Good	568.7	Poor	Yes	No	Yes	Yes	Fair	Yes	No	IV	Good	Low
Patterson Tract	N.A.	728	Mexican-American	89.9	N.A.	Poor	183.6	Poor	Yes	No	No	No	Fair	No	No	IV	Good	Low
Ivanhoe	1,616	1,595		83.9	34.2	Fair	1,953.9	Fair	Yes	Yes	Yes	Yes	Fair	Yes	No	IV	Good	Medium
Oak Ranch	N.A.	371		0.0	N.A.	Poor	408.3	Good	Yes	No	No	No	Good	No	No	I	Good	Medium
Lemon Cove	N.A.	137		34.1	39.2	Poor	121.9	Fair-Good	No	Yes	No	Yes	Fair	No	Yes	II	Fair	Medium
Exeter*	4,264	4,475		48.4	34.7	Good	5,935.0	Fair-Good	Yes	Yes	Yes	Yes	Fair	Yes	Yes	II	Good	High
Farmersville*	3,101	3,456	Black	79.0	42.4	Poor	1,961.1	Poor-Fair	Yes	Yes	Yes	Yes	Fair	Yes	Yes	II	Good	Medium
Tract 92	N.A.	325		100.0	N.A.	Poor	118.7	Poor	Yes	No	Yes	No	Fair	No	Yes	I	Fair	Medium
Tooleville	N.A.	165			N.A.	Poor	50.6	Poor	No	No	No	No	Poor	No	Yes	II	Good	

* NOTE: Incorporated cities.
** Indicates Not Available
*** High % substandard housing, sparse vegetative cover, poor streets, unproductive soils, lack of services, cultural opportunities

A PROFILE OF COMMUNITIES IN THE VISALIA-WOODLAKE SUB-PLANNING AREA

The Visalia-Woodlake sub-planning area has the greatest number of communities of all sub-planning areas in the county. Twelve communities can be placed in five of the six classifications described previously. A profile of social, economic and physical factors is shown in Table II-4.

Farm Labor Residential Communities

Communities in the farm labor residential community classification are Lindcove and Tooleville. Tooleville is located southeast of Exeter and Lindcove is located southeast of Woodlake near State Highway 198. Both communities are similar in population and size. Lindcove is more disadvantaged by location with respect to a major urban area. Since the immediate physical environment of both communities is poor, the character of the surrounding agricultural environment appears to offer the only redeeming physical quality for these communities in physical terms.

Minor Rural Service Centers

Communities included in this classification are Elderwood and Lemon Cove. Because of its location close to the Sierra foothills and its historic beginnings, Elderwood appears to have good potential for remaining economically stable, and may even exhibit modest growth. Elderwood differs substantially in physical character and quality of environment from all other communities in the sub-planning area. Its generally good quality of housing and pastoral setting are distinguishing characteristics in this regard. Elderwood has the character of a restful rural retreat. New housing during the past decade indicates a modest potential as a retirement community.

Lemon Cove also has growth potential because of its location along Highway 198 and proximity to Kaweah Lake recreation areas. Future plans indicate freeway status for Highway 198. Tourist and recreation traffic can be expected to

expand the range of services provided in the community over time. Growth in the short term will likely be very modest, based primarily on providing gasoline, groceries and other commercial services related to the needs of boaters, swimmers and campers at Kaweah Lake recreation areas. The attractive physical setting of the community marks the larger area, of which the community is a part, as an area of substantial future potential for the location of a new community.

Major Rural Service Centers

Goshen and Ivanhoe are the only two communities in this classification. Because of its location with respect to Freeway 99, the Visalia Airport, and the Visalia Industrial Park, Goshen has definite potential for continued growth and development. The Goshen community has gained in housing quality over the past decade primarily because of its being the first successful target for low-income housing provided under the Self-Help housing program. Freeway construction through the Goshen area has also contributed to community advancement through the attraction of highway commercial facilities. The future potential of Goshen may be realized best by eventual annexation to the City of Visalia. Short of annexation, the extension of a trunk sewer from the Visalia municipal treatment plant south of Goshen to serve the Goshen area would further enhance the potential of the community for economic growth.

Unlike Goshen, the community of Ivanhoe has shown a decline in population over the past ten years. Continued decline is anticipated unless a low percentage of availability of low-cost housing in the Visalia-Goshen area were to result in renewed low-cost housing interest in Ivanhoe. A continued decline in population may reduce the role of the community to that of a minor rural service center before the end of the current decade.

Municipalities

Woodlake is the smallest of the incorporated cities within the sub-planning area and within the county as a whole. However, continued population increase may elevate the status of the community to that of the seventh largest city in the county by 1980, surpassing the population of Farmersville. For its size, Woodlake has shown aggressiveness in municipal improvement during the past decade. Its attractive physical setting at the edge of the agricultural valley and close proximity to foothill and mountain recreation areas enhances the growth potential of the community. Woodlake has a complete commercial service center located astride State Highway 69. The growth of the community is due in large part to industrial expansion and to the attractiveness of the community for people employed in the Visalia-Exeter-Lindsay area.

Exeter is the sixth largest municipality in Tulare County but has shown the lowest percentage increase in growth of the seven cities which have increased in population during the past decade. Its 1960-1970 population increase has been 4.9% as compared to 7.4% for Farmersville and 28.5% for Woodlake.

Exeter is a very stable community economically, but the disparity between families with low and high incomes is great. The lack of availability of sound low-cost housing in the community continues to foreclose the community as a place of residence for many employees working in industries in the Lindsay-Exeter and Visalia area. Growth potential of the community is also limited by surrounding high-value citrus lands and the establishment of agricultural preserves on much of that land.

Farmersville lies approximately half-way between Visalia and Exeter. It had its early beginnings as a farm labor community. Through continued expansion and eventual incorporation, Farmersville has improved its ability to provide

a wider range of services and facilities required by the people of the community. A fragmented pattern of land development has had a negative influence on achieving high levels of efficiency and economy in the provision of public services and in the location of commercial and other private services available to the people of the community. A very high percentage of sub-standard housing (79%) and a correspondingly low assessed valuation provide obstacles to the provision of a wider range and higher level of municipal services. The community's close proximity to the Visalia Urban Area is likely to discourage significant private investment in commercial and industrial activities beyond current levels.

Unincorporated Residential Tracts

Communities classified as unincorporated residential tracts are Patterson Tract, Oak Ranch and Tract 92. These communities are located north, northeast and southeast of Visalia, respectively. Oak Ranch appears to have the greatest potential for eventual inclusion within the limits of the City of Visalia. Oak Ranch includes approximately 60 high-value homes built in recent years. It is entirely residential in character. The Patterson Tract and Tract 92 are older subdivision developments whose residents work in the Visalia area. The further expansion of any of the three tracts should be discouraged until they are connected to the Visalia municipal sewerage system.

THE TULARE SUB-PLANNING AREA

Physical Factors

Land within the Tulare sub-planning area is primarily devoted to the production of field crops, dairy products, and cattle and calves (See Figure II-3). Deciduous fruit is grown in the northern part of the sub-planning area but its contribution to the local agricultural economy is small by comparison to the other major agricultural activities listed above.

The Tulare sub-planning area represents a strong commitment to the agricultural preserve program, with 80-90% of the land committed outside the 2 mile wide urban expansion ring around the city. The Mooney Boulevard development corridor between Tulare and Visalia is clearly outlined with little or no agricultural preserve land within one to two miles of the Boulevard.

Most of the soil within the planning area is classified as Class III. This class is moderately good for cultivation, but its deficiencies are such that the field crops and irrigated pasture dominate the agricultural land pattern. A substantial amount of acreage in the northern part of the planning area is of the Class I type. Soils in this area represent an extension of the sizeable Class I soil area around Visalia.

There are only three urban areas within the sub-planning area which are included in the county-wide water and sewer study. They are the minor rural service center of Waukena southwest of Tulare, a residential tract south of the Tulare urban area, and a tract between Tulare and the Kings County line. The amount of land devoted to major categories of urban use in these communities is shown in Table II-5. The remaining agricultural area as a whole is sparsely populated as compared to other sub-planning areas on the valley floor. The greatest concentration of rural farm population occurs north and east of the Tulare urban area.

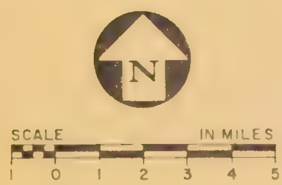
Fig. II-3

SUB-PLANNING AREAS C & D

TULARE-LINDSAY

LEGEND

	"C" TOTAL	"D" TOTAL
HOSPITAL	2	1
NURSING HOME OR CONVALESCENT HOSPITAL	2	1
HEALTH DEPARTMENT OR CLINIC	1	1
SCHOOL	17	8
(2) NUMBER OF FACILITIES		



PREPARED BY: TULARE COUNTY PLANNING DEPARTMENT

Principal highway transportation facilities include:

1. Freeway 99 through the center of the sub-planning area;

2. State Highway 63 connecting the City of Tulare with Visalia to the north;

3. State Highway 137 connecting the City of Tulare with the City of Corcoran to the southwest, and the City of Lindsay to the east. Major county roads serving the sub-planning area include Avenue 232, extending westerly into Kings County, and Avenue 216. Minor county roads comprise the rest of the county road system serving outlying farm areas.

The mainline Southern Pacific parallels Freeway 99. The Tulare Airport south of the City of Tulare and the Moore airstrip north of the city are the only aviation facilities within the sub-planning area.

The dominant resource factors affecting the sub-planning area are the Tule River along the southern boundary, Class I and Class II soils, and minor streams which are extensions of the Kaweah River Delta. Considerable flooding occurs periodically along the Tule River, but this flooding does not affect urban areas. The combination of field crops, irrigated pasture and dairy activities in the northern part of the sub-planning area create a pastoral scene reminiscent of midwestern farm areas of the United States.

TABLE II-5

URBAN LAND USE IN THE TULARE AREA, 1970 (1)

	MAJOR LAND USE CATEGORIES				
COMMUNITY PLANNING AREA	Residential	Commercial	Industrial	Public	Subtotal Developed (2)
Waukena	14.7	1.0	0.0	12.5	28.2
Tract 51	32.5	1.5	10.0	0.5	44.5
Tract 104	119.5	1.5	0.0	0.8	121.8

(1) Derived from data provided by the staff of the Tulare County Planning Department.
(2) Excluding streets, roads and vacant land.

Economic and Social Factors

The economy of the Tulare sub-planning area is highly dependent on agriculture. Industries are concentrated within or near the Tulare urban area with dairy products, farm equipment, feed, food products and agricultural spraying and chemical industries dominating industrial activities related to agriculture. The Tulare urban area has 13 industries involved in trucking operations because of the community's strategic location along Freeway 99 as a transfer point for trucking operations between Los Angeles and the San Francisco Bay area. In terms of total employment, other important industries which are not related to agriculture include film development, house trailer manufacture, printing and publishing, truck body manufacture, and the manufacture of pneumatic nailing machines. Total industrial employment within the Tulare area exceeds 1,700.

The City of Tulare is one of the three largest trading centers of the county. However, the tremendous growth in retail and service facilities in the Visalia area during the past decade has made inroads into the level of trade activity captured in the Tulare Area.

Agricultural activities within the sub-planning area have a low level of dependence on farm labor as compared to most other sub-planning areas of the county. This accounts for the lack of unincorporated communities within the area. Many of the rural area residents are of Portugese extraction and carry on mother-country traditions in dairying and animal raising. The dairy industry has grown tremendously in recent years; large new corporate dairy operations have moved to the Tulare area from the Los Angeles basin.

A PROFILE OF COMMUNITIES IN THE TULARE SUB-PLANNING AREA

The three unincorporated communities within the Tulare sub-planning area include a farm labor residential community, a minor rural service center, and an unincorporated residential tract. Social, economic and physical factors are shown in Table II-6.

Farm Labor Residential Community

Tract 51, located approximately six miles west of the City of Tulare is a farm labor residential community with 100% of its housing classified as substandard.

Minor Rural Service Center

Waukena is a minor rural service center located along State Highway 137 between the City of Tulare and the City of Corcoran in Kings County. An elementary school is the only significant public facility in the community. While the population is low (154), homes are located in a fragmented pattern on either side of the highway, with most of the homes concentrated north of the highway. Waukena is a community in decline because of the sparseness and lack of services and facilities as well as decline in the population in the surrounding rural area.

Unincorporated Residential Tracts

Tract 104 is an unincorporated residential tract located immediately south of the Tulare urban area. It is a poverty community with a high incidence of sub-standard housing. Observable physical, social and economic factors are such that it may well be classified as a farm labor residential community. However, its close proximity to Tulare indicates that it was established to house families in poverty who otherwise could not find housing in Tulare. Few residents can be considered as farm laborers. The community is so destitute that there is little opportunity to improve the quality of life for its residents unless they are encouraged to move to a larger urban area under a program which provides improved housing conditions.

TABLE II-6

PROFILE OF COMMUNITIES IN THE TULARE SUB-PLANNING AREA

COMMUNITY	SOCIAL FACTORS: POPULATION 1960	POPULATION 1970	Dominant Minority Other Than White	% Sub-standard Housing	ECONOMIC FACTORS: % Family Income Under $3,000	Adequacy of Local Employment Base	Assessed Valuation ($000's)	PHYSICAL FACTORS: Environmental Quality**	Water	Sewer	Elementary School	Fire	Streets	Library	Flood Prone	Primary Soil Class	Accessibility Major Urban Center	Expansion Affected by Agricultural Preserves
Waukena	N.A.*	154	--	47.8	22.9	Poor	34.7	Fair	No	No	Yes	Yes	Fair	No	Yes	III	Fair	Medium
Tract 51	N.A.	170	Mexican-American	100.0	N.A.	Poor	43.2	Poor	No	No	No	No	Fair	No	No	I	Fair	Medium
Tract 104	N.A.	1059	Black	N.A.	N.A.	Good	155.0	Poor	Yes	No	No	No	Poor	No	No	I	Good	Medium

PROFILE OF COMMUNITIES IN THE TIPTON-EARLIMART SUB-PLANNING AREAS

COMMUNITY	POPULATION 1960	POPULATION 1970	Dominant Minority Other Than White	% Sub-standard Housing	% Family Income Under $3,000	Adequacy of Local Employment Base	Assessed Valuation ($000's)	Environmental Quality**	Water	Sewer	Elementary School	Fire	Streets	Library	Flood Prone	Primary Soil Class	Accessibility Major Urban Center	Expansion Affected by Agricultural Preserves
Woodville	1,045	1,031	--	84.8	33.3	Poor	706.9	Poor	Yes	Yes	Yes	Yes	Fair	Yes	Yes	II	Fair	Medium
Tipton	N.A.	945	Mexican-American	61.4	33.5	Poor	731.6	Fair	Yes	Yes	Yes	No	Fair	Yes		II	Good	Medium
Allensworth	N.A.	180	Black	93.8	N.A.	Poor	3.3	Poor	Yes	No	Yes	No	Fair	No	Yes	IV	Poor	Low
Alpaugh	N.A.	771	--	70.3	37.8	Poor	116.5	Poor	No	No	Yes	Yes	Fair	Yes	Yes	IV	Poor	Medium
Earlimart	2,897	3,080	Black Mexican-American	61.7	49.0	Poor	1,738.5	Poor	Yes	Yes	Yes	Yes	Fair	Yes	Yes	I	Good	Medium
Pixley	1,327	1,584	Mexican-American	67.8	37.8	Poor	1,223.8	Fair	Yes	Yes	Yes	Yes	Fair	Yes	Yes	II	Good	Medium
Teviston	N.A.	198	Black	100.0	N.A.	Poor	176.1	Poor	Yes	No	No	No	Poor	No	Yes	I	Good	Low

* Indicates not available

** High % substandard housing, sparse vegetative cover, poor streets, unproductive soils, lack of services, cultural opportunities.

THE LINDSAY SUB-PLANNING AREA

Physical Factors

Land within the Lindsay sub-planning area is primarily devoted to the production of citrus, olive and field crops (see Figure II-3). Citrus and olive groves are concentrated in the eastern part of the sub-planning area on well drained soils which are ideal for citrus production. Some lands along the lower reaches of the foothills are devoted to the production of specialty crops such as strawberries.

Within one-half to two miles of Lindsay, 40-50% of the land is in agricultural preserves. The foothill ridge low pattern of preserve ownership, mentioned in the Exeter area, continues into this area and on down to the Friant-Kern canal near Lindsay, still difficult to rationalize. As a whole, the Lindsay sub-planning area shows 40-50% to the west and on the valley floor, rising to 60-70% in the program in the eastern section. Notable exception is the Frazier Valley acreage, leased to the Los Angeles Department of Water and Power.

Most of the soil within the sub-planning area is classified as Class I (central and eastern) and Class IV (western). Class IV land is suitable for occasional cultivation and is best suited for hay and pasture.

The Lindsay sub-planning area is the smallest sub-planning area in the county and lies half-way between the Visalia-Woodlake and Porterville sub-planning areas. The City of Lindsay dominates the urban scene. There are only three other communities (Tonyville, Plainview and Strathmore) between Lindsay and Porterville. The remaining agricultural area is moderately populated as compared to other sub-planning areas on the Valley floor. The amount of land devoted to major categories of urban use in these communities is shown in Table II-7.

Principal highway transportation facilities include State Highway 65, State Highway 137 (Tulare-Lindsay Highway), Road 192 connecting the Strathmore area with the City of Tulare, the Frazier Valley Highway connecting the Strathmore area with State Highway 190 east of the Success Reservoir, and Road 204 extending north to State Highway 198 from Cairns Corner west of Lindsay. Rail transportation is provided by a spur of the Southern Pacific Railroad. The Eckert airstrip north of Strathmore and Pruner airstrip northwest of Lindsay are the only aviation facilities within the sub-planning area.

The dominant resource factors affecting the sub-planning area are the Tule River along the southern boundary, the combination of soils and climatic factors which create ideal growing conditions for citrus and olive groves, a fine physical setting at the base of the Sierra foothills and periodic flood conditions created by overflow from Lewis Creek and Frazier Creek. During the 1969 flood, both Lewis and Frazier creeks caused extensive flooding in the Tonyville, Lindsay and Strathmore areas. The pattern of permanent crops, field crops, and foothill setting mark the Lindsay area as one of the most attractive physical settings on the Valley floor of the county.

TABLE II-7

URBAN LAND USE IN THE LINDSAY AREA, 1970 (1)

COMMUNITY PLANNING AREA	MAJOR LAND USE CATEGORIES: Residential	Commercial	Industrial	Public	Subtotal Developed (2)
Lindsay (3)	426.5	75.0	129.5	140.0	771.0
Tonyville	13.1	0.5	1.3	0.0	14.9
Strathmore	147.0	21.3	27.8	28.0	224.1
Plainview	44.0	4.0	0.0	0.5	48.5

(1) Derived from data provided by the staff of the Tulare County Planning Department.

(2) Excluding streets, roads and vacant land.

(3) Incorporated city.

Economic and Social Factors

The economy of the Lindsay sub-planning area is also highly dependent on agriculture. Industries are also mostly related to agriculture. The largest industrial employer is the Consolidated Olive Growers-Lindsay Ripe Olive Company located in the City of Lindsay, with approximately 350 employees. The largest single group of employers are involved in fruit packing; five packing houses in Strathmore and fifteen packing houses in Lindsay have a combined peak employment of over 1,600. During recent years, industrial employment within the sub-planning areas has become more diversified with the addition of the General Cable Corporation (250 employees), the Champion Home Builders Company (mobile homes - 122 employees), and the California Reel Company (28 employees). Other important industrial activities include a can manufacturer, fertilizer and spray manufacturer, food oils and shortening manufacturer, machinery manufacturer, sprinkler and irrigation equipment, toy manufacturer, trucking and cattle feeding. Eleven trucking firms are located in the community of Strathmore. Total industrial employment within the Lindsay sub-planning area during 1970 was approximately 3,100.

The high degree of industrial employment within the sub-planning area contrasted with the relatively low urban population indicates that the Lindsay sub-planning area is a net importer of employees from other sub-planning areas of the county (particularly from the Porterville and Visalia-Woodlake areas). This condition may also indicate that there is an inadequate amount of housing within price ranges which industrial employees can afford. The percentages of sub-standard housing within communities of the sub-planning area are relatively high, ranging from 64.6% within the City of Lindsay to 88.7% within Tonyville. The dominant minority population (other than white) within urban areas is Mexican-American.

A PROFILE OF COMMUNITIES IN THE LINDSAY SUB-PLANNING AREA

Three community classifications apply to the Lindsay sub-planning area. A profile of social, economic and physical factors is shown in Table II-8.

Farm Labor Residential Communities

Two communities are included in this classification: Tonyville and Plainview. Poor living conditions and a lack of commercial and public services are severe limiting factors for growth and improvement in the future. Because Plainview has more than four times the population of Tonyville and a central water system, it would be far more difficult to develop a program of property and housing relocation in a more established community such as Strathmore or Lindsay.

Major Rural Service Center

Strathmore is located half-way between Lindsay and Porterville along the old alignment of State Highway 65. Some new housing has been completed recently and a fair range of commercial services are available to the local population. Public facilities include an elementary school, high school, veterans memorial hall, library, post office and churches. Strathmore has shown an 11.6% increase in population over the past decade, partly as the result of the continued shift of population from rural to urban areas and from smaller urban centers to larger urban centers within the county, and because of the potential for employment in local industries.

Municipality

While Lindsay has shown a slight decrease in population and housing within its corporate limits, the unincorporated area has grown since 1960 to more than offset the decrease within the city limits. Public housing investments within the community have been made to improve upon the relatively high percentage of sub-standard housing conditions in the community. Despite the

TABLE II-8

PROFILE OF COMMUNITIES IN THE LINDSAY SUB-PLANNING AREA

	SOCIAL FACTORS				ECONOMIC FACTORS			PHYSICAL FACTORS										
COMMUNITY	POPULATION 1960	1970	Dominant Minority Other Than White	% Sub-standard Housing	% Family Income Under $3,000	Adequacy of Local Employment Base	Assessed Valuation ($000's)	** Environmental Quality	Water	Sewer	Elementary School	Fire	Streets	Library	Flood Prone	Primary Soil Class	Accessibility Major Urban Center	Expansion Affected by Agri. Preserves
Lindsay	5,397	5,206	Mexican-American	64.6	33.8	Good	8,285.9	Good	Yes	Yes	Yes	Yes	Fair	Yes	Yes	II	--	Medium
Tonyville	N.A.*	202	--	88.7		Poor	27.0	Poor	Yes	No	No	No	Fair	No	Yes	II	Good	Low
Strathmore	1,095	1,221	Mexican-American	65.9	37.8	Good	1,185.9	Fair	Yes	Yes	Yes	Yes	Fair	Yes	Yes	II	Good	Medium
Plainview	N.A.	842	Mexican-American	67.8	37.8	Poor	228.2	Poor	Yes	No	No	No	Fair	No	No	IV	Fair	Low
PROFILE OF COMMUNITIES IN THE SOUTHEAST FOOTHILL-SIERRA SUB-PLANNING AREA																		
Springville	N.A.	1,500	--	73.3	34.0	Poor	680.6	Fair	Yes	Yes	Yes	Yes	Fair	Yes	Yes	VII	Fair	Medium
Camp Nelson	N.A.	1,076	--	10.1	N.A.	Poor	N.A.	Good	No	No	No	Yes	Poor	No	No	VII	Poor	No
PROFILE OF THE COMMUNITY IN THE NORTHEAST FOOTHILL-SIERRA SUB-PLANNING AREA																		
Three Rivers	N.A.	1,269	--	24.8	6.0	Poor	N.A.	Fair	No	No	Yes	Yes	Fair	Yes	Yes	VII	Fair	

* Indicates not available.
** High % substandard housing, sparse vegetative cover, poor streets, unproductive soils, lack of services, cultural opportunities.

percentage of sub-standard housing, the city has a fine overall environmental quality and can boast of a variety of public services which few communities of the same size provide for the local population. Most notable among these is the large community park and pitch 'n putt golf course located in the northwestern part of the community. The community's excellent setting along the county's citrus belt provides fine views of the Sierra foothill and mountain areas to the east.

A vexing problem facing the City of Lindsay has been the continued development of new housing in the unincorporated fringe, particularly northeast of the city limits, posing a threat to water quality because of a high concentration of septic tanks in a limited area.

The community's location along State Highway 65, its ability to attract industry and its fine physical setting assure the community of further growth and development, provided that sufficient housing can be built within the community to meet the needs of industrial employees who now live in other communities of the county.

Fig. II-4

SUB-PLANNING AREAS E & F

TIPTON-EARLIMART-PORTERVILLE

LEGEND

	"E" TOTAL	"F" TOTAL
HOSPITAL	0	1
NURSING HOME OR CONVALESCENT HOSPITAL	0	3
HEALTH DEPARTMENT OR CLINIC	4	1

	"E" TOTAL	"F" TOTAL
SCHOOL	11	20
(2) NUMBER OF FACILITIES		

PREPARED BY: TULARE COUNTY PLANNING DEPARTMENT

THE TIPTON-EARLIMART SUB-PLANNING AREA

Physical Factors

The Tipton-Earlimart sub-planning area is primarily devoted to the production of field crops, dairying and cattle and calves (see Figure II-4). However, large acreages of open and undeveloped land or land used primarily for grazing runs through the center of the sub-planning area on a north-south alignment. The area southeast of Earlimart is the beginning of a large area in vineyards which extends across the south-central part of the county into Kern County.

The Tipton urban area is well defined by agricultural preserve land and between Tipton and Pixley about 80% of the land is so held while to the north ownership is in the 50% range. Although much of the land near Pixley is in large ownership parcels, only in the west does the agricultural preserve land rise to 80-90% of available lands; east of Pixley the small ownership percentage still prevails (50%). Participation in the Land Conservation Program has left Pixley with little room for expansion.

Much of the land west of Earlimart is held for mineral extraction (hydrocarbons) and these owners have not participated in the program. Less than 20% of the land between Earlimart and Alpaugh is agricultural preserve land.

As indicated by crop patterns (high-value field crops and vineyards), and the area between Pixley and Earlimart and extending south in a broadening band to the Kern County line is a Class I soil area. The remaining dominant acreage of the sub-planning area is divided almost equally between Class II and Class IV soils.

The area west of Freeway 99 is quite wide open in character and the lack of natural vegetation and high alkaline soils combine with summer temperatures

to create a hot, dry and dusty environment in the western part of the sub-planning area. All of the urban communities are unincorporated with the majority of the population located in a lineal cluster of communities along Freeway 99. Proceeding from north to south, the communities along Freeway 99 are Tipton, Pixley, Teviston and Earlimart. Three other communities are located at the eastern and western extremities of the sub-planning area. Woodville is located half-way between Tipton and Porterville, and Alpaugh and Allensworth are located west of Earlimart near the Kings County line. The amount of land devoted to major categories of urban use in these communities is shown in Table II-9.

Freeway 99 traverses the heart of the sub-planning area. Other major highway transportation facilities include State Highway 43 (Central Valley Highway) in the western part of the sub-planning area (connecting communities within Kern, Tulare, Kings and Fresno counties); State Highway 190 extending from Tipton east to Porterville and the Sequoia National Forest, Avenue 168 (through Woodville), Avenue 152 (connecting Tipton and Porterville), Avenue 96 (connecting Pixley and Terra Bella), Avenue 56 (extending west of Earlimart to Alpaugh and east of Earlimart to Ducor), and Road 192 along the eastern boundary of the sub-planning area. Rail transportation facilities include the mainline Southern Pacific along Freeway 99 and the mainline Santa Fe along State Highway 43. A small airstrip is located southwest of Pixley.

TABLE II-9

URBAN LAND USE IN THE TIPTON-EARLIMART AREA, 1970 (1)

COMMUNITY PLANNING AREA	MAJOR LAND USE CATEGORIES				
	Residential	Commercial	Industrial	Public	Subtotal Developed (2)
Woodville	90.0	8.0	43.8	9.0	150.8
Tipton	83.5	24.5	35.2	28.8	172.0
Allensworth	11.0	2.0	0.0	1.0	14.0
Alpaugh	70.0	3.0	0.0	20.0	93.0
Earlimart	132.8	30.3	29.0	48.3	240.4
Pixley	147.5	30.5	33.5	59.0	270.5
Teviston	35.0	2.5	18.5	1.0	57.0

(1) Derived from data provided by the staff of the Tulare County Planning Department.

(2) Excluding streets, roads and vacant land.

The dominant resource factors affecting the sub-planning area are the Tule River along the northern boundary, Deer Creek and White River through the Pixley-Earlimart areas, the Friant-Kern Canal, a high alkaline content soil area in the western part, and large areas subject to extensive flooding in central and western parts of the sub-planning area. Deer Creek and White River have a long history of creating extensive flood conditions during periods of high runoff. Flooding from these uncontrolled stream systems has affected the communities of Alpaugh, Allensworth, Earlimart and Pixley, and has closed Freeway 99 to traffic, requiring detours to the Central Valley Highway and State Highway 65. Flooding and poor soil conditions in the western part of the sub-planning area have created hazardous conditions for farming. The Pixley Wildlife Refuge was established on such lands because of their low economic utility.

Economic and Social Factors

While the economy of the Tipton-Earlimart sub-planning area is highly dependent on agriculture, the urban population is not prosperous by comparison with the urban population of most other sub-planning areas of the county. The adequacy of the local employment base in all communities is classified as poor, and some of the communities have a very high percentage of families earning under $3,000 per year. Sub-standard housing is also very high, ranging from 61.4% in Tipton to 100% in Teviston. The dominant minority groups (other than white) are Mexican-American and Black. A high percentage of families receive welfare assistance because they have been unable to find employment since the widespread application of mechanization to agriculture within the area. Industrial employment in 1970 was 26 in Earlimart and 32 in Pixley, indicating a very low ratio of industrial employment to total population within the sub-planning area.

The sub-planning area is highly dependent upon communities outside of the sub-planning area for a wide range of public and private services and facilities. Population in the northern part of the area looks to the City of Tulare as its trade center, while communities in the central and southern parts of the area look to Porterville and Delano. Delano is located only seven miles south of Earlimart across the Kern County line.

A PROFILE OF COMMUNITIES IN THE TIPTON-EARLIMART SUB-PLANNING AREA

Communities within the sub-planning area cover three of the six classifications of communities described previously. A profile of social, economic and physical factors is shown in Table II-6.

Farm Labor Residential Communities

The three communities included in this classification are Allensworth, Alpaugh, and Teviston. Allensworth was established near the turn of the century as a sanctuary in the west for Negroes. The community was founded by Col. Allen Allensworth, the highest ranking Black in the military services at that time. The community attracted many black families from the southern part of the United States.

This population dropped sharply during World War II as residents moved to war industry-related jobs in metropolitan areas of the state. With the mechanization of cotton picking during the 1950's, Allensworth declined to a 1970 population of 180.

The dream of Colonel Allensworth to establish Black community in the west may yet be realized if the State of California pursues vigorously to implement preliminary plans by the State Department of Parks and Recreation to establish a state historical park in Allensworth. Such a plan is based on the fact that it is the only California community founded, financed and governed (originally) by Blacks. The State Department of Parks & Recreation has done an initial study to determine the feasibility of establishing a state historical park. Plans call for restoring the town much in the manner as the state has restored gold-mining communities of the Mother Lode counties. Preliminary plans call for provision of camping, picnicking, recreational grounds, restored buildings, and a convention center for youth groups interested in pursuing California's Black history.

Unless these plans come to early fruition, however, the lack of employment opportunities, an extremely high percentage of sub-standard housing (94%), and limited public services mark Allensworth for continued decline and eventual dissolution. (An additional impediment to continued occupation of the townsite in the past has been poor water conditions with arsenic levels such that special filters are required on domestic water supplies from the Allensworth system.) It would be a tragedy if the dream of a new Allensworth were to become a nightmare of despair for local residents as the result of years of indecision as to whether the state historical park concept will be carried out.

Alpaugh is the largest of the farm labor residential communities, but its population is also declining under many of the same forces which have affected the community of Allensworth. If it were not for its poor condition, Alpaugh might be better classified as a minor rural service center. Regardless of its classification, the future of Alpaugh is comparatively bleak and further population decline can be expected.

Teviston is an essentially Black community established during the 1950's. Housing within the community is 100% sub-standard and, until recently, residents had to haul water to the community from nearby ranches. The small size of the community and its combination of social, economic and physical factors mark Teviston as another community which should be made the subject of intensive study leading toward the relocation of families in larger urban areas of the sub-planning area.

Minor Rural Service Center

The population of Woodville has remained very stable over the past decade, indicating that it will continue to perform its role as a minor rural service center as long as farm labor requirements remain sufficiently high within the

surrounding agricultural area to support the existing population. There is little prospect for growth and there is heavy prospect for decline over the next decade as a higher percentage of agricultural production becomes mechanized. Offsets to such decline are possible since the community has its own water and sewer systems and other public services.

Major Rural Service Centers

The communities of Tipton, Pixley and Earlimart are major rural service centers located at five and six-mile intervals along Freeway 99. Each of these communities has shown some population increase during the past decade as part of the rural to urban shift in population. Each of the communities has water and sewer systems and a fair level of public services. As the largest of the three communities, Earlimart is likely to enlarge its dominance over the other two and reach the point where municipal status may be feasible.

THE PORTERVILLE SUB-PLANNING AREA

Physical Factors

Located in the southeastern part of the valley floor area of the county, the Porterville sub-planning area is considerably varied in its physical character (see Figure II-4). The area includes the second largest urban center of the county (Porterville), and a varied agricultural land pattern (citrus, field crops, grazing, vineyards), and topographic conditions ranging from flat valley terrain to gently rolling foothills and foothill valleys. Citrus production is concentrated in the northern part of the planning area; field crops and vineyards are found in the western and southwestern part of the planning area; gently rolling foothill grazing lands pocketed with occasional citrus groves are found in the southeastern part of the planning area; and foothill valleys (Success and Frazier valleys) are found in the northeastern part of the planning area. The Success Valley contains the largest water reservoir in the county in terms of surface area.

Porterville is in the throes of an aggressive annexation program, i.e., urban expansion, which probably explains the fact that within 3 miles of the city limits only 5% of the land is in agricultural preserves. Along the Tule River and to the Frazier Valley to the north, little land is reserved. It is only 4-5 miles to the west and southwest that the more typical 60-70% participation in the program is evidenced.

Terra Bella and Ducor have minimal participation in the program within a 4 mile radius of the town limits as well as in a corridor along Highway 65, but then the 40-50% utilization pattern for the program appears. However, the pattern around the Richgrove area is in distinct contrast, i.e., the present urban area is quite confined by agricultrual preserves and a definite urban boundary has been established. A large area of foothill open range country, practically all of T24S and R28E has only 15% participation in the program.

Urban population is concentrated in and near the Porterville area in the northern part of the sub-planning area. Unincorporated communities included within the water and sewer study located in this area are Terra Bella, Poplar, Cotton Center, and Tract 213. Ducor is located in the south-central part of the planning area along Highway 65 and Richgrove is located in the south-western corner of the planning area near the Kern County line. The amount of land devoted to major categories of urban use in these communities is shown in Table II-10.

Principal highway transportation facilities include State Highway 65, State Highway 190, the Frazier Valley highway along the northern boundary of the sub-planning area, Avenue 152, Road 192 along the west boundary of the planning area, Road 256-252 east of Porterville, and the Old Stage Road extending south-east to Porterville to Fountain Springs and White River in the foothills east of the sub-planning area. In addition, the old alignment of State Highway 65 from the vicinity of the Porterville Airport north to Lindsay serves as an important county highway.

Both Southern Pacific and Santa Fe railroad spurs traverse the sub-planning area on a north-south alignment, joining at Ducor and utilizing joint trackage south to the Richgrove area. The Porterville Municipal Airport is an important airport facility serving the area, generating considerable general aviation activity. The Annual Porterville Fly-In has become an important event attracting vintage aircraft from throughout the state and the west.

TABLE II-10

URBAN LAND USE IN THE PORTERVILLE AREA, 1970 (1)

COMMUNITY PLANNING AREA	MAJOR LAND USE CATEGORIES Residential	Commercial	Industrial	Public	Subtotal Developed (2)
Richgrove	23.8	5.5	19.0	16.0	64.3
Ducor	10.3	8.0	15.5	5.3	39.1
Terra Bella	87.0	15.4	85.0	17.0	127.9
Poplar	97.3	7.8	0.0	9.0	114.1
Cotton Center	19.3	2.5	24.5	0.0	46.3
Woodville Center					
Tract 213	36.0	4.0	3.0	0.0	43.0

(1) Derived from data provided by the staff of the Tulare County Planning Department.

(2) Excluding streets, roads and vacant lands.

The dominant resource factors affecting the sub-planning area in addition to terrain are the Tule River, Deer Creek and White River; the Friant-Kern Canal; Success Reservoir; and a Class II soil area which covers all of the sub-planning area except the most southeastern part which is covered by Class VII soils suitable only for grazing. Flood conditions have occurred along Deer Creek in the Terra Bella area during periods of high runoff.

Minor flooding has occurred along the Tule River in the Porterville area but this has not affected urban development because of the flood control features of Success Dam and Reservoir. The physical setting of the sub-planning area is particularly attractive and scenic along Highway 65 and State Highway 190 extending east of Porterville. The rolling terrain along southern reaches of State Highway 65 has yielded some natural gas production. New drilling activity occurs periodically in an attempt to establish producing oil and gas wells.

Economic and Social Factors

Although agriculture provides an important base for employment in the area, industrial development and recreation service provides diversification in the local economic base. Total industrial employment within the sub-planning area was nearly 1,600 in 1970, with 80% of this employment concentrated in the Porterville area. In addition to citrus packing and processing which accounts for an employed force of more than 650, other agriculturally-oriented industries include lumber production and fertilizer and spraying services. The principal non-agriculturally related industries involve meter and valve assembly (Rockwell -110 employees), precision instruments and electronics (Beckman Instruments - 300 employees), pre-fab buildings (Modular Medical Systems - 50 employees), printing and engraving (five firms - 200+ employees), steel building manufacturing (Vicco - 21 employees), women's sportswear (Sierra Sportswear - 50 employees), and helicopter overhaul and construction (55 employees). The State Hospital at Porterville is the largest single employer in the area. The City of Porterville also dominates the fields of retail trade and commercial service for the southern portion of the county, extending its influence to Lindsay on the north, Tipton on the west and Springville and Camp Nelson on the east.

A PROFILE OF COMMUNITIES IN THE PORTERVILLE SUB-PLANNING AREA

The Porterville sub-planning area has two of the six classifications of communities described previously. A profile of social, economic and physical factors is shown for these communities in Table II-11.

Minor Rural Service Centers

Ducor, Richgrove and Poplar-Cotton Center are minor rural service centers. Poplar and Cotton Center are treated as a single service center because of their close physical proximity (one-half mile apart). All three centers have central water systems (except Poplar) and provide limited retail and commercial services required by people in the surrounding rural area. Richgrove and Poplar-Cotton Center are centers for farm labor housing, whereas Ducor is more of a crossroads community whose historical role has been more service-oriented than housing-oriented. Richgrove and Ducor have gained in population over the last decade whereas Poplar-Cotton Center has lost population.

The decline of population in Poplar-Cotton Center is due in part to its closer physical relationship to the Porterville urban area. Another factor affecting decline has been the extremely poor environmental quality of Poplar. As compared to Poplar, housing quality in Cotton Center is very high. The combined population of Poplar and Cotton Center is 1,456. A continued decline in Poplar and only a slight decline in Cotton Center is likely to result in a combined population decline of approximately 25% by 1980. Competition from the Porterville urban area for major services and from the Woodville community for day-to-day services are factors which will contribute towards decline in the Poplar-Cotton Center area.

Richgrove is likely to continue to increase in population as a housing center for agricultural workers in the vineyard area of southern Tulare County and northern Kern County. Commercial and industrial expansion is not anticipated in Richgrove because of its close proximity to the City of Delano.

TABLE II-11

PROFILE OF COMMUNITIES IN THE PORTERVILLE SUB-PLANNING AREA

	SOCIAL FACTORS				ECONOMIC FACTORS			PHYSICAL FACTORS										
COMMUNITY	POPULATION 1960	POPULATION 1970	Dominant Minority Other Than White	% Sub-standard Housing	% Family Income Under $3,000	Adequacy of Local Employ-ment Base	Assessed Valuation ($000's)	Environ-mental Quality**	Water	Sewer	Elementary School	Fire	Streets	Library	Flood Prone	Primary Soil Class	Accessi-bility Major Urban Center	Expansion Affected by Agricultural Preserves
Richgrove	400	1,023	Mexican-American Filipino	69.9	47.5	Poor	368.1	Good	Yes	No	Yes	No	Fair	No	No	I	Good	High
Ducor	218	264	--	69.6	40.4	Poor	122.6	Fair	Yes	No	Yes	Yes	Fair	Yes	No	II	Fair	Low
Terra Bella	964	1,037	Mexican-American	59.1	35.9	Fair	471.5	Fair	No	Yes	Yes	Yes	Fair	Yes	Yes	II	Good	Low
Poplar	1,478	1,239	Mexican-American	84.2	33.3	Poor	329.5	Fair	No	No	Yes	No	Fair	Yes	No	II	Fair	Low
Cotton Center	N.A*	217	--	27.7	N.A.	Poor	147.2	Good	Yes	No	No	No	Fair	Yes	No	II	Fair	Low
Tract 213	N.A.	307	--	21.7	N.A.	Poor	311.2	Fair	No	No	Yes	No	Good	No	No	II	Good	Medium

*Indicates not available.
**High % substandard housing, sparse vegetative cover, poor streets, unproductive soils, lack of services, cultural opportunities.

Major Rural Service Center

Terra Bella is the only major rural service center within the sub-planning area, but lacks a central water system. Terra Bella offers a fair range of commercial and public services and is a minor industrial center. However, competition from the Porterville urban area only six miles to the north will be a discouraging factor in attracting new private investment in housing and commercial services, as well as the lack of a central water system. Terra Bella could increase its housing supply substantially if an adequate supply of low and modest-income housing is not provided in the Porterville urban area. Such increase, however, would provide a disproportionately low tax base in relation to requirements of the population for public facilities and services.

Unincorporated Residential Tract

Tract 213 is an unincorporated residential tract located 3-1/2 miles west of Porterville. It was established as a modest-income housing area after World War II. Housing quality is fairly high (only 21.7% sub-standard). However, future expansion should be discouraged until such time as Tract 213 becomes a physical part of the Porterville urban area. The urban density of residential lots and reasonable proximity of Tract 213 to the Porterville municipal sewage treatment plant indicate that consideration be given to the provision of sewer service by connection to the Porterville system.

Fig. II-5

SUB-PLANNING AREA G

THE SOUTHEAST FOOTHILL-SIERRA SUB-PLANNING AREA

Physical Factors

Land within the Southeast Foothill-Sierra Sub-Planning Area is dominated by foothill and mountain terrain, with cattle ranching as the only significant agricultural activity (see Figure II-5). Most lands within the sub-planning area are of the Class VII type which are unsuitable for cultivation. There are only two urban areas -- Springville and Camp Nelson -- both located along State Highway 190 east of Porterville. The amount of land devoted to major categories of urban use in these communities is shown in Table II-12.

The Tule Indian Reservation and National Forest Lands are not in the Land Conservation Program to any appreciable degree, however, much of the western foothill slope areas participate, varying in degree from 25% near Springville to 80% between California Hot Springs and Fountain Springs. Privately owned high mountain lands are virtually untouched throughout this sub-planning area.

During the past decade permanent homes have been developed on rural estate-size parcels in the foothill area bordering Success Valley between Success Reservoir and Springville. The physical setting of this area is extremely attractive and a greater concentration of permanent homes, approaching an urban status, is quite likely.

State Highway 190 is the principal transportation access within the sub-planning area. The highway extends easterly from Porterville to Springville and Camp Nelson, and then connects with a major Forest Service highway which extends southerly through the Sequoia National Forest via Quaking Aspen and Johnsondale into Kern County. Additional access to recreation areas is provided from Springville northerly to Balch Park and from the Ducor area easterly to the California Hot Springs Recreation area in the southern part of the sub-planning area. Dominant resource factors are the Tule River, the Deer Creek and White River stream groups, and the forested areas at upper elevations. These factors

combine to attract heavy recreation use, particularly within the National Forest. Because of its location upstream from the Success Dam, parts of Springville along the Tule River are subject to periodic flooding.

Economic and Social Factors

The economy of the sub-planning area is strongly dependent upon the recreation attraction of the area. Cattle ranching has been a diminishing aspect of the local economy. The county-owned hospital at Springville was a major employer until the hospital was closed as a tuberculosis treatment center, with a resulting loss of approximately 200 jobs. The county has made efforts to lease the hospital to a private group for sanitarium or job-training purposes. Logging is a minor industrial activity. Logging activity is sporadic because of its dependence upon a limited allowable timber cut within the National Forest. Recreation camps have become an important activity in mountain areas. Springville serves as the center for social and economic activity within the sub-planning area, whereas Camp Nelson is predominantly a recreation community. Springville is an aging community, with more than 73% of its housing in a sub-standard condition.

TABLE II-12

URBAN LAND USE IN THE SOUTHEAST FOOTHILL SIERRA AREA, 1970 (1)

COMMUNITY PLANNING AREA	MAJOR LAND USE CATEGORIES Residential	Commercial	Industrial	Public	Subtotal Developed (2)
Springville	37.5	19.5	1.0	24.0	82.0
Camp Nelson	173.0	13.5	1.0	5.0	192.5

(1) Derived from data provided by the staff of the Tulare County Planning Department.

(2) Excluding streets, roads and vacant land.

A PROFILE OF COMMUNITIES IN THE SOUTHEAST FOOTHILL-SIERRA SUB-PLANNING AREA

The communities of Springville and Camp Nelson are classified as a major rural service center and recreation-oriented and retirement community, respectively. Social, economic and physical factors are shown in Table II-8.

Major Rural Service Center

The historical role of Springville as a major rural service center for surrounding cattle ranches and logging operations changed over the years as cattle and logging operations declined. While Springville still serves surrounding cattle ranches, the community's most recent major role has been that of a health center because of the Springville Hospital. With the closing of the hospital, continuation of this role is in doubt unless the County of Tulare is successful in leasing the hospital facility for the continuation of health services on a private basis.

Because of its close proximity to mountain recreation areas and camps in the Sierra, services offered in Springville now cater in part to the needs of the recreation market. The picturesque scenic setting of the community and a growing recreation service market are factors which will combine to enlarge Springville as a recreation-oriented service community. The annual Springville Rodeo is a major recreation attraction. However, Springville may first experience a population decline in the short term if an appropriate use is not established in the Springville Hospital facility to create new employment opportunities. In time the recreation market of the area may grow sufficiently to offset declines created by the loss of hospital employment. Much interest has been expressed by residents for a planning and community improvement program in recognition of the need to create a substantial magnate for tourism.

A factor which would have a definite positive impact on community growth potential would be the reconstruction of State Highway 190 to a first-class facility and its extension easterly across the Sierra to Inyo County. Such

extension is included as part of the State Freeway and Expressway System. State Highway 190 through the Springville area is also included as part of the State Master Plan of Scenic Highways. The County and State Highway Departments are preparing the initial steps to achieve official designation of Highway 190 as a Scenic Highway. This, in all probability, will increase the rate of tourist traffic in the area and provide short-term economic benefits. Moreover, increased traffic through such designation may assist in advancing the timing when Highway 190 would be extended across the Sierra.

Recreation-Oriented Community

Camp Nelson is located along the upper reaches of the Tule River near the eastern terminus of State Highway 190. Its elevation and environmental quality of the surrounding area gave impetus to the development of summer homes many years ago. From a few homes in the early 1950's, Camp Nelson has expanded to a permanent population of approximately 125 with permanent residences being constructed along with additional summer homes to create a sizeable recreation community of nearly 1100 at peak occupancy. A small group of stores in old western motif and a lodge provide commercial services. However, the community is mostly dependent upon commercial services provided in Springville and Porterville. The disposal of sewage through use of individual septic tank and leach lines has posed serious problems in parts of Camp Nelson, with effluent eventually discharging into the Tule River. While the Camp Nelson area has considerable potential for further expansion, such expansion should be discouraged until central sewage collection treatment and disposal is provided in a manner which is consistent with discharge standards developed by the Regional Water Quality Control Board.

Fig. II-6

SUB-PLANNING AREA H

PREPARED BY TULARE COUNTY PLANNING DEPARTMENT

THE NORTHEAST-FOOTHILL-SIERRA SUB-PLANNING AREA

Physical Factors

Land within the sub-planning area is dominated by foothill and mountain terrain, with cattle ranching as the principal agricultural use of private lands. The southern boundary of the sub-planning area is the ridge line which separates the Kaweah River watershed from the Tule River watershed to the south. The important community of Three Rivers is located along the Kaweah River east of Kaweah Lake and is the gateway community to the Sequoia National Forest and Sequoia National Park recreation areas of the High Sierras. The small recreation community of Silver City is located along the east fork of the Kaweah River at an elevation of approximately 6,500' near Mineral King Valley (Figure II-6).

Only about ten percent of the privately held land in this area is in agricultural preserves and therefore this program has little effect on planning in this locality.

State Highway 198 provides the principal transportation access to the planning area, extending east to the boundary of the Sequoia National Park and continuing northerly through the park into Kings Canyon National Park and to a connection with State Highway 180 which provides a loop to Fresno. Yokohl Drive provides access to the Balch Park area along the southern boundary of the sub-planning area. State Highway 198, as well as State Route 65, servicing the area from the south along the east side of the valley, are proposed Scenic Highways and are planned and budgeted to be upgraded to freeway status by late 1970's. In addition, Route 276 is planned to be constructed from Three Rivers to the Mineral King development at a cost of $23,000,000, when final approval for that development is granted.

Economic and Social Factors

The economy of the sub-planning area is strongly dependent upon recreation and tourism. Although there has been some recent development in the area of retirement and summer homes, tourism is the major source of outside capital coming into the community.

Cattle ranching and logging are minor aspects of the local economy. There are several recreation areas in or near the Three Rivers area, all of which are used year around, with the majority of people coming into the area on their way to the National Forest and National Park Recreation areas. The improvement and expansion of State Highway 198 enhances future development of Three Rivers as a primary recreation community.

Recreation-Oriented and Retirement Community

Three Rivers developed from its beginning in the mid 1850's as a minor rural service center for surrounding cattle ranches and logging operations, as well as early silver mines in the Mineral King area. As the natural resource based operations such as these declined over the years, the scenic and climatic attributes of the Kaweah River Valley began to be of importance in attracting retirement, recreation-oriented and creative, artistic people who could be relatively independent of commercial-industrial centers in choosing their living locations. A new community image jelled and became evident and a certain community character and pride arose. The present conservative, middle-aged, middle-class population seems satisfied, for the most part, with the serene, scenic, small town atmosphere of Three Rivers.

Sequoia National Park has always attracted large numbers of tourists, who availed themselves of the commercial services of Three Rivers merchants, but the demands have been of manageable proportions. Recently, however, Walt Disney Productions has planned a $35,000,000 year round recreational complex

at Mineral King which, if approved, could force substantial change in the settlement of Three Rivers. A current Community Attitude Survey has pointed up the unrest generated by this prospect among the local residents. It emphasizes that present desires are to discourage intense residential development in the area, and to keep the generally open, rural feeling of the settlement, with limited commercial development allowed along the proposed, upgraded State Highway 198. Most of the residents do their major shopping in nearby larger communities and are content to keep Three Rivers a primarily residential community.

Situated as it is, in an easily accessible, scenic area between the proposed Mineral King development and a large, recreationally-oriented subdivision of some 8,500 acres proposed by Boise-Cascade, Three Rivers may be subject to uncontrollable pressures which will not allow the retention of its present flavor. Its expansion possibilities should not be encouraged until central sewer and water systems are developed, since it is in a location where thin soil mantle and scarce water make on-the-lot-septic tanks and individual water supply systems unacceptable in large numbers.

TABLE II-13

URBAN LAND USE IN THE NORTHEAST FOOTHILL SIERRA AREA, 1970 (1)

COMMUNITY PLANNING AREA	MAJOR LAND USE CATEGORIES				
	Residential	Commercial	Industrial	Public	Subtotal Developed (2)
Three Rivers	348.0	83.5	0.0	113.0	544.5

(1) Derived from data provided by the Staff of the Tulare County Planning Department.

(2) Excluding streets, roads, and vacant land.

TRENDS IN REAL ESTATE VALUE

TABLE II-I

URBAN LAND USE IN THE DINUBA AREA, 1970[1]

COMMUNITY PLANNING AREA	MAJOR LAND USE CATEGORIES Residential	Commercial	Industrial	Public	Sub-Total Developed[2]
Traver	18.8	6.0	25.0	13.0	62.8
London	78.0	6.0	0.0	2.0	86.0
Delft Colony	35.7	0.3	11.5	0.0	47.5
Sultana	27.5	7.0	23.5	20.5	78.5
Orosi	216.0	26.0	19.0	45.0	306.0
Cutler	135.8	15.9	44.2	18.5	214.4
East Orosi	15.8	0.8	4.1	0.4	21.0
Monson	25.5	2.0	0.0	0.0	27.5
Yettem	22.0	0.5	1.0	5.0	28.5
Seville	37.0	1.3	0.0	3.8	42.1

(1) Derived from data provided by the staff of the Tulare County Planning Department.

(2) Excluding streets, roads and vacant land.

TABLE II-1-a

NEW UNITS IN TULARE COUNTY (3)
(See corresponding Plate II-1)

Incorporated Cities	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	Total From 1960 to 1970
Dinuba	47	77	64	72	141	35	37	29	17	18	36	573
Exeter	7	25	8	13	17	41	22	29	24	11	39	236
Farmersville	--	21	26	28	31	12	6	36	19	15	28	222
Lindsay	20	16	13	10	4	15	9	14	4	21	32	158
Porterville	22	26	50	38	74	41	102	84	64	62	66	629
Tulare	55	51	74	137	132	110	70	59	75	69	63	895
Visalia	249	286	254	160	1,186	188	262	220	368	402	504	3,079
Woodlake	31	16	20	21	9	19	24	12	18	16	10	196
Inc. Area Total	431	518	509	479	594	461	532	483	589	614	778	5,988
Unincorporated (4) Area Total	224	259	619	744	649	636	719	454	722	450	522	5,998
County Total, Inc. + Uninc.	655	777	1,128	1,223	1,243	1,097	1,251	937	1,311	1,064	1,300	11,986
Total as % of Grand Total	5.5	6.5	9.4	10.2	10.4	9.2	10.4	7.8	10.9	8.9	10.8	100.0

(3) Source: Tulare County Planning Department.

(4) New units in incorporated areas are listed separately by city and totaled by year. Because data is not collected and arrayed by unincorporated "areas", new units are listed as a total by year.

TABLE II-1-b

NET HOUSING GAIN IN TULARE COUNTY [5]
(See corresponding Plate II-2)

Year	Units Demolished	New Units		Net Gain	Net Gain as a % of Total Gain
1960 [6]	--		(655)	--	--
1961 [6]	--		(777)	--	--
1962 [6]	237	2,560	(1,128)	2,323	20.9%
1963	45	1,223		1,178	10.6%
1964	115	1,243		1,128	10.1%
1965	95	1,097		1,002	9.0%
1966	78	1,251		1,173	10.6%
1967	97	937		840	7.6%
1968	67	1,311		1,244	11.2%
1969	70	1,064		994	8.9%
1970	64	1,300		1,236	11.1%
TOTALS	868	11,986		11,118	100.0%

[5] Source: Tulare County Planning Department

[6] Because of a lack of data for demolitions for 1960-1962, a simple average (mean) was derived from the remaining years and applied to the first three years. The average is shown listed after 1962. Similarly, net gain listed under 1962 is the total for the three-year period 1960-1962.

New Housing Units Constructed by Year Within Tulare County

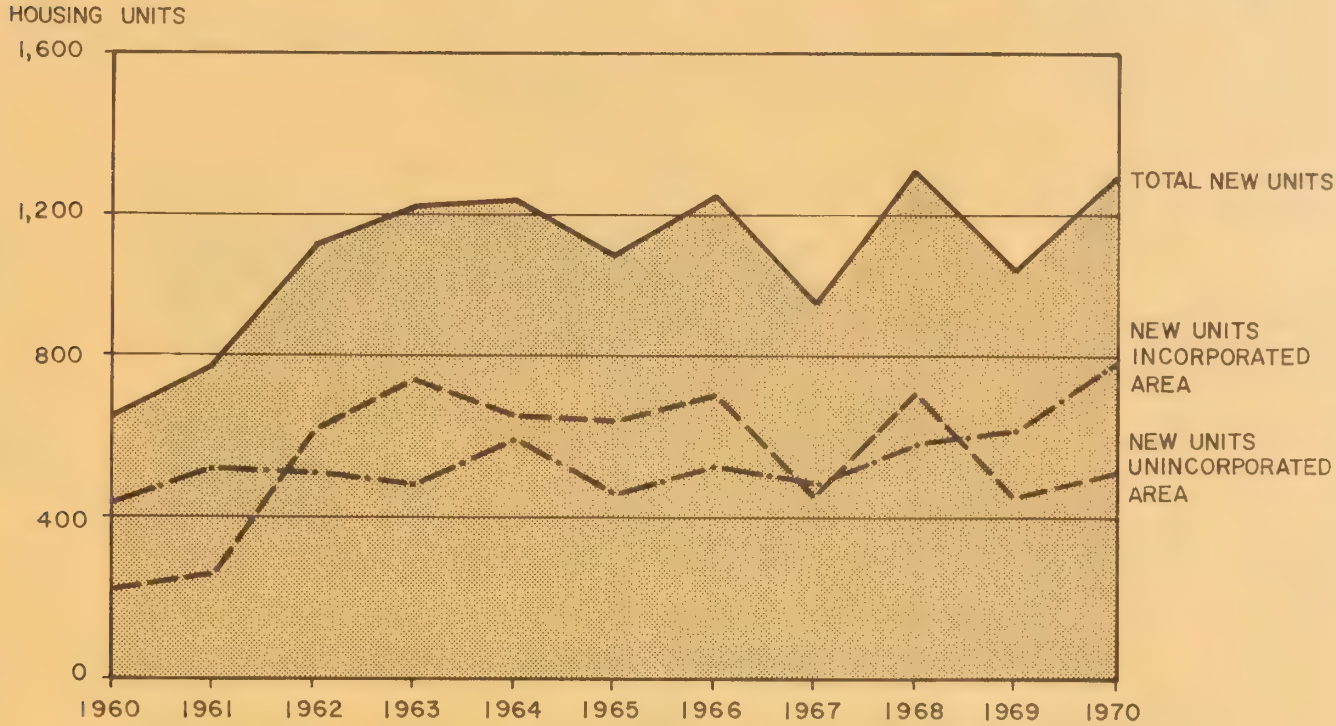


Plate II-1

Net Housing Gain In Tulare County 1960-1970

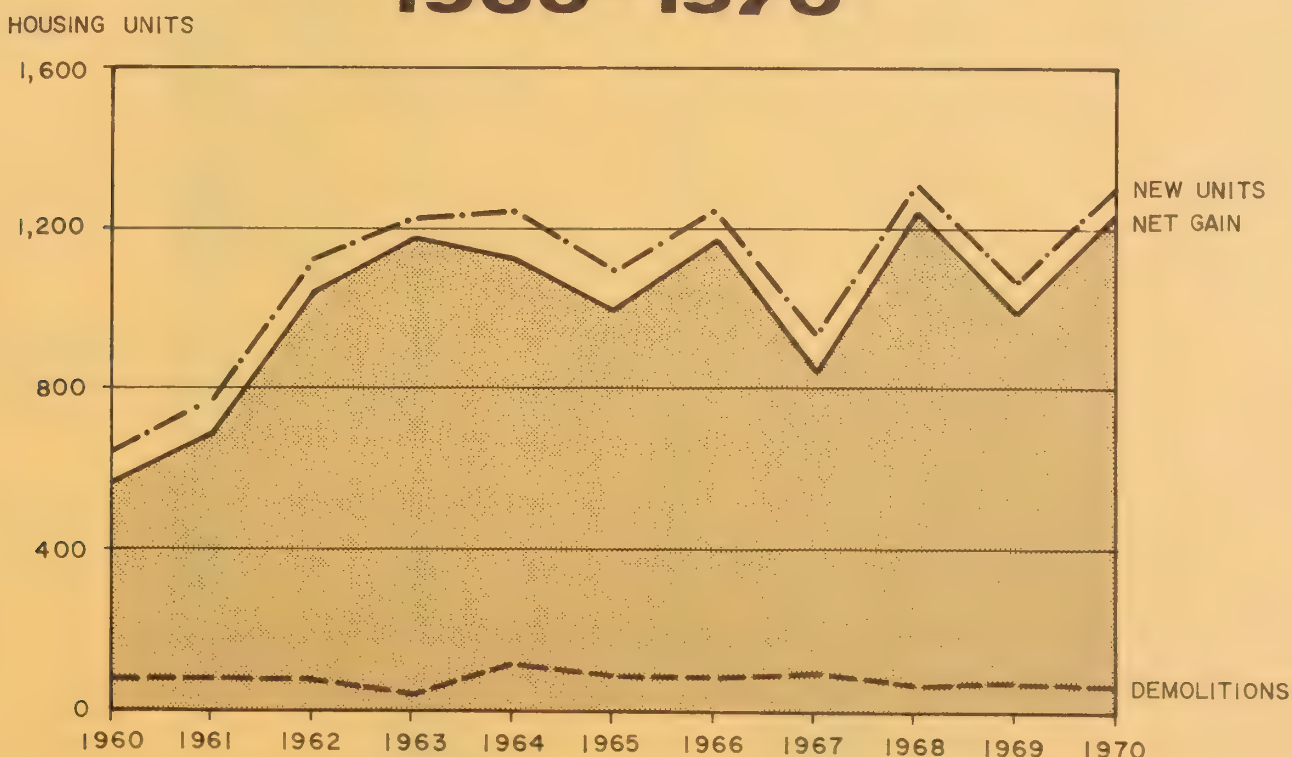


Plate II-2

A Sample of Average Payments For A New Home - 1965 & 1969

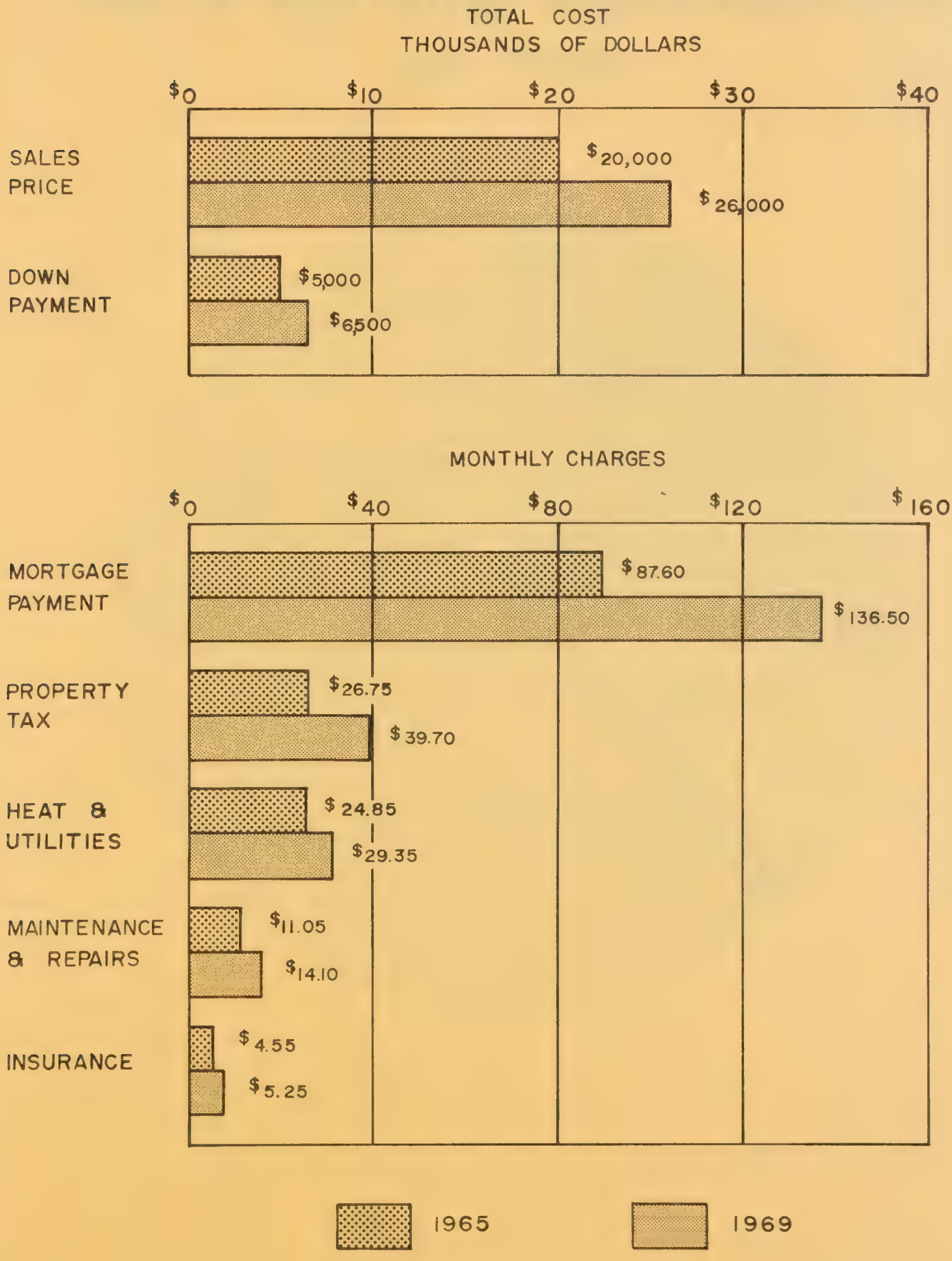
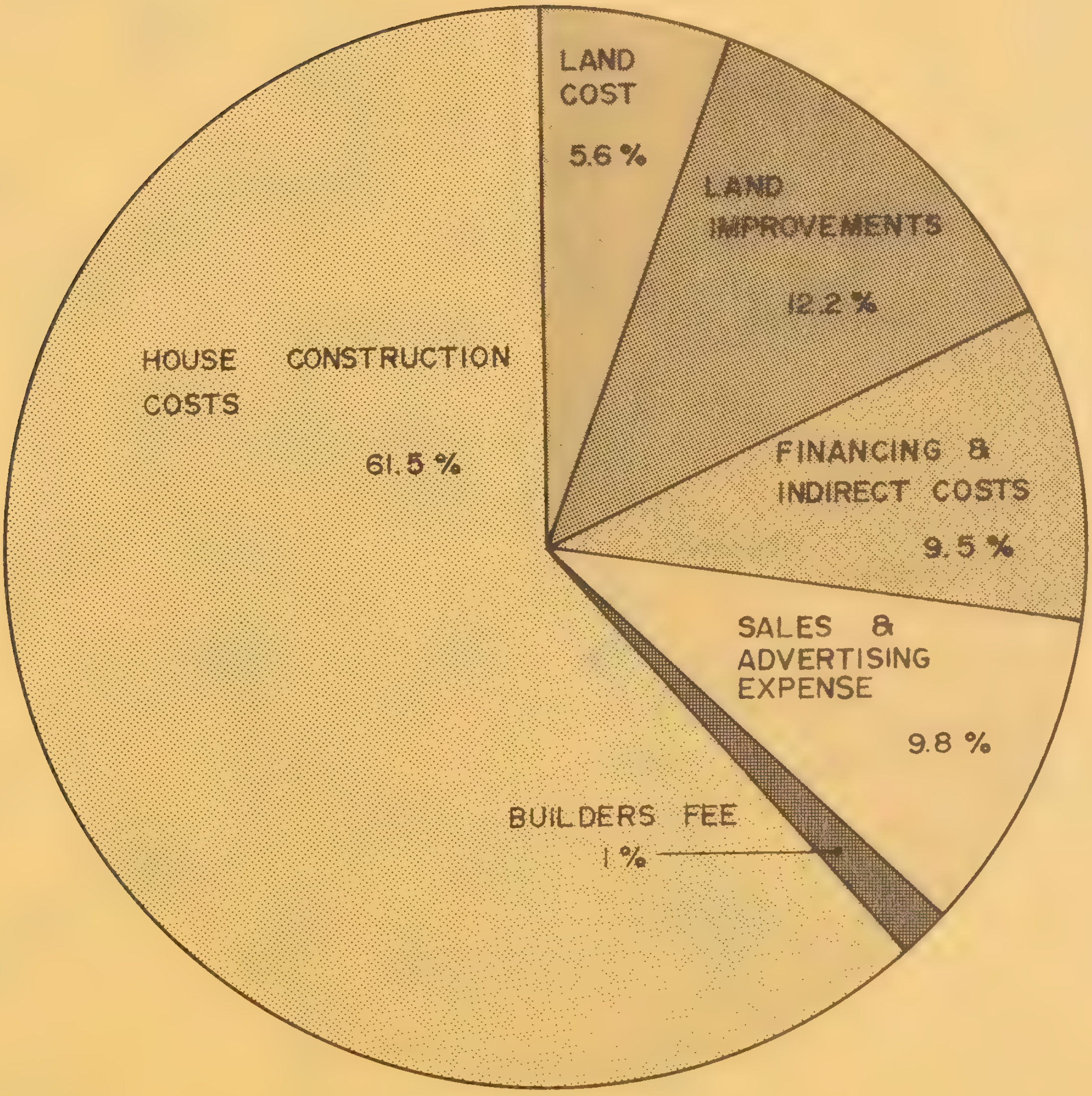


Plate II-3

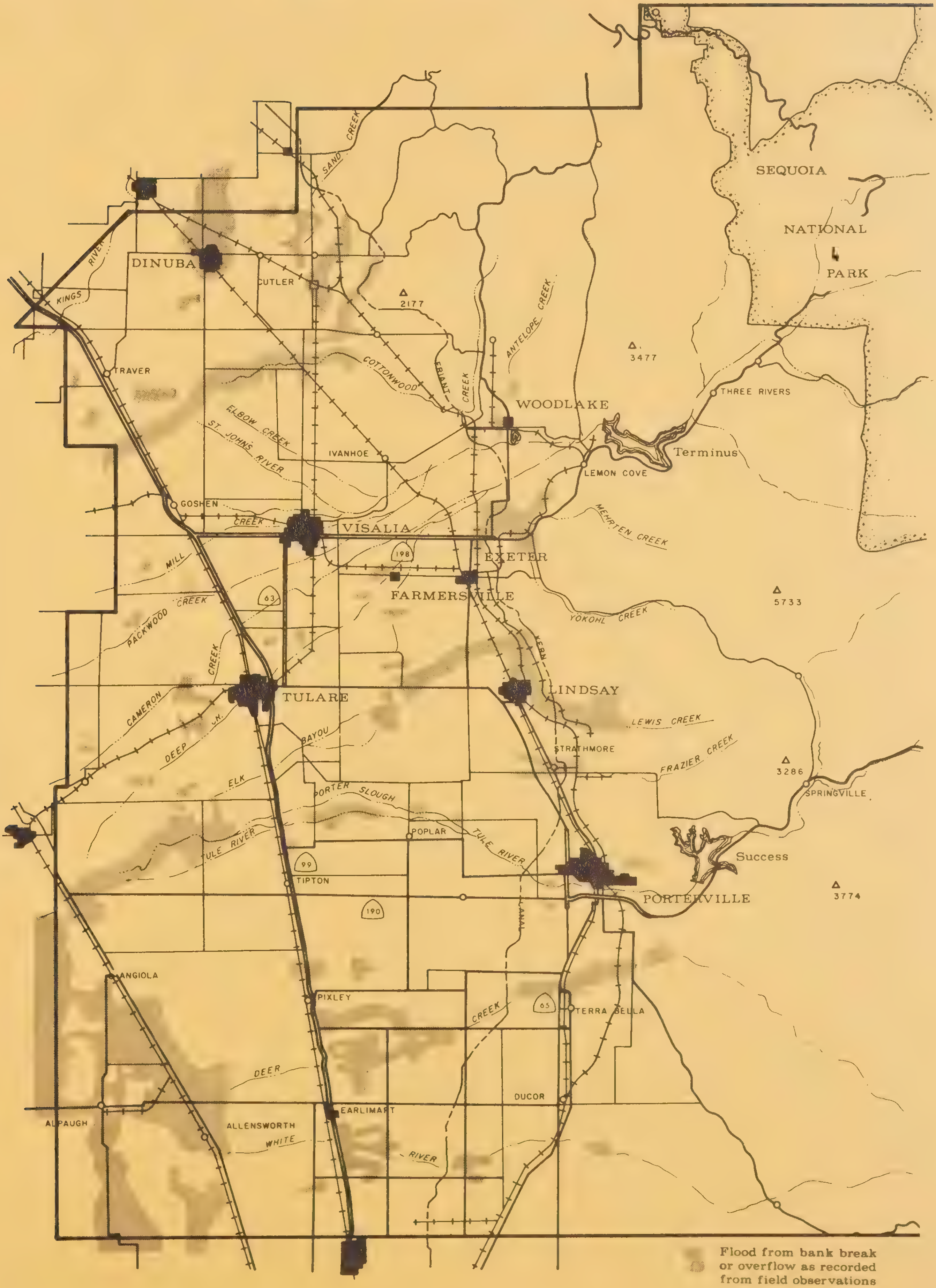
PREPARED BY TULARE COUNTY PLANNING DEPARTMENT 7/71

Estimated Cost Breakdown For A Housing Development In 1969



PREPARED BY TULARE COUNTY PLANNING DEPARTMENT 7/71

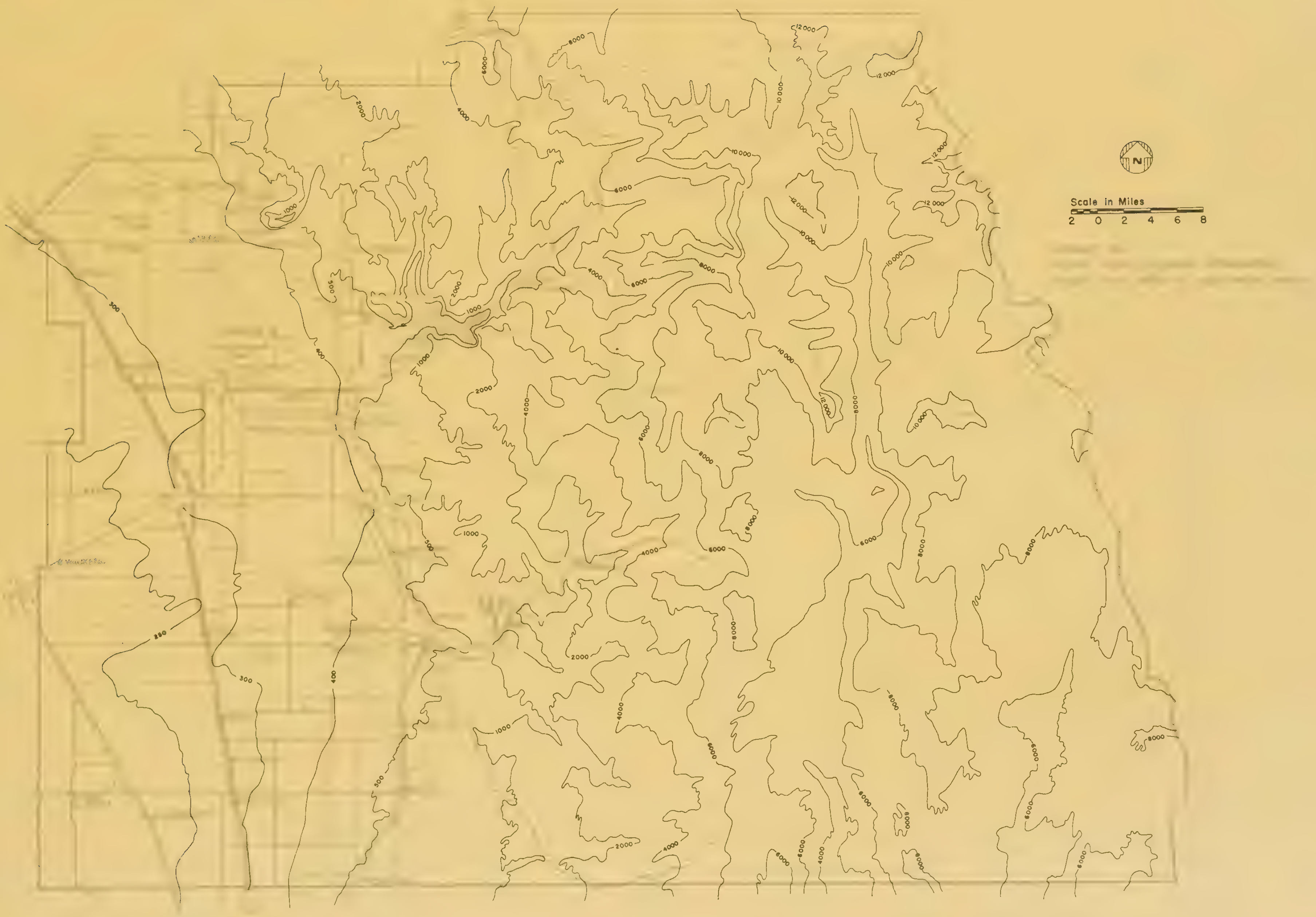
TYPICAL REGIONAL FLOOD



Flood from bank break or overflow as recorded from field observations

Plate II-6

TULARE COUNTY
CONTOUR MAP



CHAPTER THREE

POPULATION AND ECONOMIC ANALYSES AND PROJECTION - COMMUNITY DEVELOPMENT SKETCH PLANS

CHAPTER III

POPULATION AND ECONOMIC ANALYSES AND PROJECTIONS-COMMUNITY DEVELOPMENT SKETCH PLANS

INTRODUCTION

This chapter provides the basic community planning framework required for the preparation of sewer and water plans for communities included in the study. The first section covers the projections of future population and economic activity. The second section presents future land requirements for communities which are expected to increase in population. The final section of the chapter describes the sketch plans which are shown graphically as the basis for sewer and water plans presented in Chapter VIII.

POPULATION AND ECONOMIC PROJECTIONS TO 1980 AND 1990

The assumptions underlying population projections to 1980 and 1990 are based on a variety of factors which reflect the range of economic conditions and population characteristics which are most likely to affect future growth. Since future population levels will be influenced strongly (but not exclusively) by future levels of employment, employment projections were developed concurrently with population projections. The first part of this section presents population projections for the county, major urban areas and unincorporated communities, and the latter part presents economic considerations which are expected to support the attainment of population projections.

Regional and County Population Growth Trends

In order to develop population projections for the cities and unincorporated communities included in the water and sewer study, it was necessary to first develop projections for the county and the larger region of which Tulare

County is a part. County projections of 227,300 for 1980 and 272,050 for 1990 are shown in Table III-1. These projections are based on a comparison of county and regional projections as developed in 1967 by the State Department of Finance with results of the 1970 Census of Population.

Projections by the Department of Finance were based on more optimistic rates of fertility and net migration for the State of California than has been evidenced in the past two years. The Department's projections were therefore adjusted to reflect the percentage difference in population as projected by the Department for 1970 and the actual 1970 Census count. The difference for the region was 6.33 percent; the difference for the county was 9.59 percent. The Department's projections for the region and the county were reduced by these percentages to achieve the adjusted projections shown in Table III-1.

Table III-2 shows a comparison of adjusted projections in Table III-1 with projections prepared by the Tulare County Planning Department in 1969. By adjusting Planning Department projections with respect to the 1970 Census in the same manner followed in developing Table III-1 projections, the resulting adjusted county projection is very close to the 227,300 1980 projection in Table III-1. This comparison provides a reasonable check on the adjustment procedure used in Table III-1.

During the period 1950-1970, the population of the county increased by an average per decade of 12.32 percent. Projections for the period 1970-1990 indicate an average increase per decade of 20.18 percent. This higher percentage assumes that: (1) the County will reach a point during the current decade when it will experience a net in-migration; and (2) the County will experience higher levels of non-agricultural employment than occurred over the past 20 years.

TABLE III-1

COMPARATIVE POPULATION GROWTH TRENDS, 1950-1990, SAN JOAQUIN VALLEY AND TULARE COUNTY

Year	Eight-County Region (1)	Tulare County	Tulare Co. as Percent of Region	Change in Percent of Region by Decade Tulare County
1950	1,136,800 (2)	149,264 (2)	13.13	
1960	1,424,900 (2)	168,403 (2)	11.81	-1.32
1970	1,626,009 (2)	188,322 (2)	11.58	-0.23
1970	1,729,000 (3)	206,400 (3)		
		P R O J E C T I O N S		
1980	2,040,900 (3)	249,500 (3)		
1980 (Adjusted)	1,911,712 (4)	227,300 (4)	11.88	+0.30
1990 (Adjusted)	2,266,900 (4)	272,050 (4)	12.00	+0.12

(1) Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus and Tulare Counties.

(2) U.S. Census of Population.

(3) State Department of Finance, "Preliminary Projections of California Areas and Counties to 1985," April 1967, (as of July 1 each year).

(4) Department of Finance Projections were adjusted by the percent difference resulting from the numerical differences from the 1970 Census counts. The difference for the region was 6.33 percent and for the county 9.59 percent. The projection for 1990 (adjusted) is an extrapolation of state projections for 1970-1985. Projections by the Department of Finance were based on a median statewide projection of fertility and net migration.

In September, 1971, the Population Research Unit of the State of California released a report entitled "Provisional Projections of California Counties to 2,000." These projections were prepared to reflect new assumptions concerning the components of population change -- births, deaths and migration. Projections for Tulare County in the report are considerably lower than those shown in Table III-5 -- 211,500 for 1980 and 236,400 for 1990, as compared to 227,300 and 272,050 respectively as shown in Table III-5.

The more conservative State projections can neither be discounted nor can they be substituted for those shown in Table III-5. A rationale for reconciliation of projection differences is provided in the report of the Population Research Unit which states, in part, that:

> "...if some of the figures below do not agree with their judgments (i.e., the judgments of local officials, planners and other analysts) the disagreement is attributable to a differing viewpoint. The populations presented in this report and the net migration figures underlying them probably lean more heavily on the immediate past and less on the formulations of local and regional plans than local or regional planners would like. This work was influenced by their advice when it was offered, but it was necessary to temper it with recent experience in the interests of the statewide pattern of growth. It is not often possible to evaluate in advance the effects of local general plans or expected economic development."

Clearly, the overall record of State projections for rural counties of the San Joaquin Valley have been low over the past 15 years. Projections for Tulare County have been insensitive to changing economic trends, particularly those relating to industrial employment unrelated to agriculture, because these trends have a minor quantitative significance when equated with those occurring in major metropolitan areas of the state. The new projections for the State should therefore be used together with those provided in Table III-5 to indicate the probable low to high range of population for the county, with the State projections reflecting low expectations in future industrial employment.

The Population of City Urban Areas

Tables III-5, III-8 and III-9 present the population projections recommended for use in the planning of water and sewer facilities in all cities and unincorporated communities in the county. Tables III-3, 4, 6 and 7 present basic population data utilized in preparing the projections shown for cities and unincorporated communities.

The projected population for the cities and their surrounding urban areas is shown in Table III-5. The term "urban area" is significant because it is the entire urban area of the city -- its corporate area and unincorporated developed fringe -- which must be included in the water and sewer plan. The relationship between city and fringe population which comprises the urban area population is shown in Table III-3. An alarming aspect of this relationship is that the population growth of the fringe area has kept pace with or exceeded the population growth of the corporate city area in all but three of the urban areas. The continued growth of population in fringe areas poses serious obstacles to achieving integrated water and sewer service and high standards of water quality within urban areas.

Table III-4 shows the changes which occurred in the population of the urban areas of the county's eight cities from 1960 to 1970. From the last column of figures, it can be seen that all of the urban areas except Exeter increased in their percentage of total county population. The modest decrease in the Exeter area has at least been partly influenced by the high cost of citrus land surrounding the community and therefore the difficulty of converting that land for moderate income housing needs of people who work in the Exeter area and live elsewhere.

TABLE III-2

COMPARISON OF 1980 COUNTY POPULATION PROJECTIONS

	1970	1975	1980	1985
1. County Planning Department, 1969	194,000 (1)	213,000 (1)	234,000 (2)	255,000 (1)
2. 1970 Census Count	188,322			
3. Difference (Line 1- Line 2)	5,700			
4. Adjusted Planning Department Projections		207,300 (3)	228,300 (3)	249,300 (3)
5. Table V-1 Projections			227,300	

(1) Middle of ranges projected by the County Planning Department.

(2) Extrapolation of 1975 and 1985 projections as prepared by the County Planning Department.

(3) Line 1 1980 projection minus the difference shown in Line 3.

TABLE III-3

POPULATION OF CITIES AND THEIR URBAN AREAS, 1960-1970

City	Incorporated City			Urban Area		
	1960 (1)	1970 (1)	Percent Change 1960-1970	1960 (2)	1970 (3)	Percent Change 1960-1970
Dinuba	6,103	7,917	+ 29.7%	7,400	9,200	+ 24.3%
Exeter	4,264	4,475	+ 4.9%	5,100	5,500	+ 7.8%
Farmersville	3,101	3,456	+ 11.4%	3,100	4,000	+ 29.0%
Lindsay	5,397	5,206	- 3.5%	6,600	8,000	+ 21.2%
Porterville	7,991	12,602	+ 57.7%	20,000	25,000	+ 25.0%
Tulare	13,824	16,235	+ 17.4%	18,100	23,100	+ 16.6%
Visalia	15,791	27,268	+ 72.7%	27,800	40,000	+ 43.9%
Woodlake	2,623	3,371	+ 28.5%	2,800	3,600	+ 28.6%
Urban Area Totals	59,094	80,530	+36.3%	90,900	118,400	+ 30.3%

(1) 1970 Census of Population.

(2) Report No. 1, Tulare County Area General Plan.

(3) Derived from range estimates prepared by the Tulare County Planning Department, 1969.

TABLE III-4

CHANGES IN THE POPULATION OF MAJOR URBAN AREAS, 1960-1970

	POPULATION					
Area	1960	Percent (1)	1970	Percent (1)	Numerical Increase	Percent Change as Percent of Total (2)
County	168,403	100.00	188,322	100.00	19,919	
Dinuba Urban Area	7,400	4.39	9,200	4.88	1,800	+ 0.49
Exeter Urban Area	5,100	3.02	5,500	2.92	400	- 0.10
Farmersville	3,100	1.84	4,000	2.12	900	+ 0.28
Lindsay	6,600	3.91	8,000	4.24	1,400	+ 0.33
Porterville	20,000	11.87	25,000	13.27	5,000	+ 1.40
Tulare	18,100	10.74	23,100	12.26	5,000	+ 1.52
Visalia	27,800	16.50	40,000	21.24	12,200	+ 4.74
Woodlake	2,800	1.66	3,600	1.91	800	+ 0.25

(1) Percentage which each urban area represents of the total county population.

(2) Increase (or decrease) in percentage of total county population.

TABLE III-5

MEDIUM-RANGE POPULATION PROJECTIONS TO 1980 AND 1990
TULARE COUNTY, CITY URBAN AREAS AND RURAL FARM AREAS

Area	Population 1970	Percent	1980	Percent	1990	Percent
1. County	188,322	100.00	227,300(1)	100.00	272,050	(1)
2. Dinuba Urban Area	9,200	4.88	12,210	5.37	15,940	5.86
3. Exeter Urban Area	5,500	2.92	6,410	2.82	7,400	2.72
4. Farmersville Urban Area	4,000	2.12	5,460	2.40	7,290	2.68
5. Lindsay Urban Area	8,000	4.24	10,390	4.57	13,330	4.90
6. Porterville Urban Area	25,000	13.27	33,340	14.67	43,720	16.07
7. Tulare Urban Area	23,100	12.26	31,320	13.78	38,900	14.30
8. Visalia Urban Area	40,000	21.24	59,050	25.98	83,570	30.72
9. Woodlake Urban Area	3,600	1.91	5,760	2.46	8,190	3.01
10. City Urban Areas	118,400	62.87	168,520	74.13	218,340	80.25
11. Remainder of County	69,922	31.13	58,780	25.81	53,710	19.74
12. Unincorporated Communities	32,188	17.09	35,407(2)	15.13	38,950(2)	14.32
13. Rural Farm	37,734	20.04	23,373(3)	10.28	14,760(3)	5.42

(1) From Table III-1.

(2) The population of unincorporated communities reported in the 1960 Census increased by 21.04 percent during 1960-70 and represented 52.09 percent of the total unincorporated community population in 1970 of 32,188. Projections assume a 10 percent decade increase overall recognizing that most large centers will grow while most small centers will decline.

(3) Reflects a continued decline in the rural farm population through further consolidation of farming units and further migration of farm families to urban areas.

TABLE III-6

POPULATION OF MINOR URBAN AREAS, 1960-1970

Area	1960 (1)	1970 (2)	Percent Change 1960-1970
Dinuba Sub-Planning Area	N.A. (3)	7,874	N.A.
Traver	350	374	+ 66.9
London	N.A.	708	
Delft Colony	N.A.	428	
Sultana	N.A.	325	
Cutler-Orosi	3,239	5,260	+ 62.4
East Orosi	N.A.	100	
Monson	N.A.	100	
Yettem	N.A.	354	
Seville	N.A.	314	
Visalia-Woodlake Sub-Planning Area	N.A.	4,845	N.A.
Elderwood	N.A.	241	N.A.
Lindcove	N.A.	147	N.A.
Goshen	1,061	1,324	+ 24.8
Ivanhoe	1,616	1,593	- 1.3
Lemon Cove		187	
Tooleville		165	
Tract #92		325	
Patterson Tract		728	
Oak Ranch		185	
Tulare Sub-Planning Area	N.A.	1,383	
Waukena	N.A.	154	
Tract #51	N.A.	170	
Tract #104	N.A.	1,059	(Included as part of Tulare urban area)

(1) 1960 Census of Population. (2) 1970 Census of Population
(3) N.A. -- not available.

TABLE III-6 (Continued)

POPULATION OF MINOR URBAN AREAS, 1960-1970

Area	1960	1970	Percent Change 1960-1970
Lindsay Sub-Planning Area	N.A.	2,265	N.A.
Strathmore	1,095	1,221	+ 11.5
Plainview	N.A.	842	N.A.
Tonyville	N.A.	202	N.A.
Tipton-Earlimart Sub-Planning Area	N.A.	7,789	N.A.
Tipton	N.A.	945	N.A.
Pixley	1,327	1,584	+ 19.4
Earlimart	2,897	3,080	+ 6.3
Woodville	1,045	1,031	- 1.3
Allensworth	N.A.	180	N.A.
Alpaugh	N.A.	771	N.A.
Teviston	N.A.	198	N.A.
Porterville Sub-Planning Area	N.A.	4,087	
Richgrove	N.A.	1,023	
Ducor	218	264	+ 21.1
Terra Bella	964	1,037	+ 7.6
Poplar-Cotton Center	N.A.	1,456	- 16.2 (Poplar)
Tract 213	N.A.	307	
Southeast Foothill-Sierra Sub-Planning Area	N.A.	2,676	
Springville	N.A.	1,500	
Camp Nelson	N.A.	1,076	
Northeast Foothill-Sierra Sub-Planning Area	N.A.	1,269	N.A.
Three Rivers	N.A.	1,269	N.A.
Tract 107	N.A.	(Included in total for Three Rivers)	N.A.
Total Population (Minor Urban Areas)	N.A.	32,188	N.A.

TABLE III-7

POPULATION OF URBAN AND RURAL AREAS, 1970

Area	1970 Population	Percent of County
Major Urban Areas	118,400	62.87
Minor Urban Areas	32,188	17.09
Total Urban	150,588	79.96
Total County	188,322	100.00
Rural Farm	37,734	20.04

TABLE III-8

POPULATION OF UNINCORPORATED COMMUNITIES, 1970-1990
REFLECTING FACTORS OF POPULATION DECLINE

Community	POPULATION 1970	1980	1990
A. Population Loss Expected:			
Allensworth	180	140	100
Alpaugh	771	600	400
Delft Colony	428	400	350
East Orosi	100	60	20
Ivanhoe	1,595	1,575	1,300
Lindcove	147	140	100
Monson	100	60	20
Plainview	842	842	750
Poplar-Cotton Center	1,456	1,300	900
Seville	314	300	250
Sultana	325	250	200
Teviston	198	150	50
Tooleville	165	130	40
Tonyville	202	150	50
Tract #51	170	140	100
Waukena	154	130	100
B. Little Population Change Expected:			
Patterson Tract	728	728	700
Traver	374	400	400
Tract #92	325	325	300
Tract #213	307	307	300
Woodville	1,031	1,000	1,000
Yettem	354	350	350

TABLE III-8 (Continued)

POPULATION OF UNINCORPORATED COMMUNITIES, 1970-1990
REFLECTING FACTORS OF POPULATION DECLINE

Community	POPULATION 1970	1980	1990
C. Population Gain Expected			
Camp Nelson	1,076	1,500	1,900
Cutler-Orosi	5,260	7,260	8,400
Ducor	264	300	340
Earlimart	3,080	3,300	3,500
Elderwood	241	270	300
Goshen	1,324	1,860	2,400
Lemon Cove	187	200	300
London	708	800	800
Oak Ranch	185	(Included in Visalia Urban Area)	
Pixley	1,584	1,900	2,100
Richgrove	1,023	1,170	1,300
Springville	1,500	1,700	1,900
Strathmore	1,221	1,350	1,500
Terra Bella	1,037	1,100	1,200
Three Rivers	1,269	2,035	4,000
Tipton	945	1,000	1,050
Tract #107	(Included in Three Rivers)		
Total, All Communities	31,188	35,400	38,950

TABLE III-9

POPULATION OF UNINCORPORATED COMMUNITIES 1970-1990
ASSUMING NO APPRECIABLE DECLINE

Community	Population 1970	1980	1990
A. (See Section A, Table III-8)			
Allensworth	180	170	160
Alpaugh	771	750	720
Delft Colony	428	420	400
East Orosi	100	100	100
Ivanhoe	1,595	1,590	1,550
Lindcove	147	145	140
Monson	100	100	100
Plainview	842	842	830
Poplar-Cotton Center	1,456	1,350	1,300
Seville	314	310	300
Sultana	325	315	300
Teviston	198	190	180
Tooleville	165	150	140
Tonyville	202	200	180
Tract #51	170	160	150
Waukena	154	150	140
B. (See Section B, Table III-8, no change)			
C. (See Section C, Table III-8, no change except as below)			
Cultler-Orosi	5,260	7,105	8,090
Earlimart	3,080	3,190	3,245
Pixley	1,584	1,790	1,845

The percentage changes shown in Table III-4 provide an important basis for projecting urban area populations as shown in Table III-5. The projections assume that each urban area will share in the population growth of the county at least to the extent experienced during the 1960-1970 decade. The percentage changes for 1960-1970 in Table III-4 were applied to the 1970 population and resulting 1980 projection shown in Table III-5. These projections reflect the further assumptions that the rural population of the county will continue to decline and that the population of unincorporated communities will, in the aggregate, represent a declining percentage of total county population.

The Population of Unincorporated Communities

Table III-6 shows the population of unincorporated communities in 1960 and 1970 and the percent change which occurred during the decade (to the extent that 1960 data was available). This data was used in part as a basis for the allocation of future population to the larger unincorporated communities included in the water and sewer study. Additional insight for all communities was drawn from the analysis of physical, economic and social factors presented in Chapter II.

Population allocations to the unincorporated communities are shown in Tables III-8 and III-9. Two separate allocations have been made to reflect uncertainties concerning the future of many communities, particularly those minor rural service centers and residential tracts which have a high incidence of sub-standard housing, a low assessed valuation, and a low incidence of public services and facilities required for an adequate urban living environment.

The allocations shown in Table III-8 are generally more realistic for purposes of water and sewer planning. Sixteen of the communities are expected to lose population, five are expected to remain fairly stable, and gains are expected in 18 communities.

Of the communities expected to gain in population, the Cutler-Orosi community deserves special mention. Cutler-Orosi was the top-ranked unincorporated community in 1970 and is expected to retain this status throughout the planning period or until it achieves municipal status. Cutler-Orosi could well join the ranks of other cities long before 1990 since the two community urban area already has a combined population greater than that of the Farmersville and Woodlake Urban areas. The question of municipal status has an important bearing on projecting population for the community. If the same approach was followed for Cutler-Orosi as for the city urban areas, then Cutler-Orosi would have 3.66 percent of the county's population in 1980 and 4.54 percent in 1990. This translates into population totals of 8,320 and 12,320 for 1980 and 1990 respectively. A more modest approach was followed because the attainment of such high projections would depend greatly on attaining municipal status and offering a wide range of urban services capable of attracting new industry. The projections in Table III-8 are more a reflection of attracting population from farms and from smaller and less-endowed unincorporated communities in the north county area than from industrial expansion.

The loss in population expected for those communities shown in Table III-8 reflects several important considerations: (1) a general decline in agricultural employment; (2) employment opportunities, improved housing conditions, and an adequate range of public services and facilities will be found only in larger communities; (3) the quality of the urban environment in communities expected to lose population will further deteriorate; (4) the economic base of these communities will be insufficient generally to finance and maintain water and sewer facilities, even with federal loans and grants; (5) geographic isolation of community makes it unable to even maintain federal state funded systems; and (6) too close to a more viable community. Heavy tax bur-

dens for such facilities would only serve to increase burdens on the individual family and act to encourage people to leave the community.

The population allocations shown in Table III-9 are different from those in Table III-8 primarily as they relate to communities shown in Table III-8 which are expected to decline. No change is shown for these communities over the period of projection in Table III-9 on the assumption that the primary factors which would influence decline in Table III-8 would not be sharp enough to actually cause decline. Thus the factors which would influence retention of population (although not expansion) would be: (1) little accomplishment in providing job opportunities and improved housing for low-income families; (2) the market for retaining existing sub-standard housing would be great because of additional pressures brought on through an in-migration of farm labor families to the county; (3) little progress would be made by the county in attempting to concentrate needed services at selected communities on a consolidated basis, and (4) little progress would therefore be possible toward encouraging family relocation to viable communities as part of a phased overall program.

The contrasting allocations of Table III-8 and III-9 point up a major dilemma facing county government -- that unless the county makes a major effort toward improving the quality of life in those rural communities which have the best chance for attaining or maintaining viability and to gradually seek a phasing out of non-viable communities, the county will be trapped in a cycle of ever-increasing costs of providing government services to all unincorporated communities much as the unemployed and underemployed farm labor family is trapped in the cycle of poverty. The allocations in Table III-9 assume that little or nothing will be done. It is a prospect that the county can ill afford, either in terms of the economics of government service or, more importantly, of the human values involved.

A significant point to consider is that the high incidence of sub-standard housing in many communities, when combined with the moderate winter climate of the county and opportunity for occasional seasonal work, makes the county highly attractive for a further in-migration of families with low levels of occupational skills who would swell the roll of welfare recipients. Part of the high gain in the agricultural labor force experienced by the county over the past decade (discussed later in this chapter) can be attributed to these factors of attractiveness. One must also remember that there are few welfare recipients in affluent counties and cities of the state, and that many families have migrated to California in recent years because of the superior health and welfare package available in California. Thus, Tulare County can expect to experience even greater levels of sub-standard housing and costs of government services if little effort is expended to deal effectively with the needs of people in non-viable unincorporated communities.

Economic Factors Affecting Population Growth

There are several economic factors which are important to the study and which were considered in the development of population projections. In summary, these factors are:

1. The opportunity for obtaining unskilled and semi-skilled employment in agriculture will continue to decline through the next two decades. This will result in the migration of population from rural areas and many unincorporated communities to larger communities in the county.
2. Overall levels of economic activity will increase by 1980 and 1990 to support the population projections for the county and its major urban areas. Population increase will depend mostly on continued growth in non-agricultural employment.

3. The potential for expansion in manufacturing and non-manufacturing activities is considerable. Growth in "footloose" industry and in recreation and tourism will elevate these activities as major components of the county's economy. Employment and population projections assume that large-scale recreation development will take place at Mineral King and at other locations within the Kaweah and Tule River watersheds.
4. A greater number of families will find adequate housing within means allowed by their income within communities where the head of the household is employed. This will cause some shift in population among communities, particularly within the Visalia-Woodlake sub-planning area.
5. The number of owner-operated farms will decline as the result of economies of scale which dictate increases in the size of economic farm units required to produce farm profits. Corporate farm operators will continue to acquire larger units either through purchase or lease of smaller units. This decline will be heightened by changes in crop patterns which are dictated by changes in national and international markets for farm products, by changes in available supplies of surface water, by the introduction of more advanced (and high capital cost) techniques of farm operation and by a probable reduction in the capacity of certain crops to resist damage by insects and plant diseases.

Agricultural Employment and Migration

Agriculture has for many years been, and still remains, the most important factor in the Tulare County economy, even though there is a marked trend of increased industrialization and tourist impact. The total gross income from agriculture over the past ten years amounts to nearly 3-1/2 billion dollars

and has averaged more than 340 million dollars each year for the past decade. The 1969 value of agriculture products was an all-time high of $378,849,000. Tulare County has historically been second in the value of its agriculture products in the counties of California and in the nation. At the present time, more citrus is produced in Tulare County than in any of the other 58 counties of the state, and is rapidly becoming one of the leading areas in the state for the dairy industry. Other principal crops in Tulare County are cotton, cotton seed, alfalfa, grapes, olives, navel and Valencia oranges, peaches, plums, walnuts, vegetables, livestock (including cattle and beef cattle), poultry and poultry products.

In being largely dependent on agriculture, the county's economy has been vulnerable to the many changes which have taken place within the agricultural sector. Changes in crop types, employment requirements, farm size, production yields, harvesting and processing methods, agricultural services, commodity distribution, farm machinery, pest control, fertilizing, irrigation practices and farm management have had important but varying effects upon the economy. The economy has been improved by such change, particularly through growth in industries and services related to agriculture. However, such improvement has been offset to a great extent by such factors as declining farm income in relation to investment, inflation, labor problems, persistent unemployment, a rise in welfare recipiency and the level of welfare services, tax policy and further aggravation of low income housing conditions.

Agricultural employment within the county has shown substantial gains over the 11-year period 1960-1970 in contrast with the prevailing pattern throughout the San Joaquin Valley. The gain in average annual agricultural employment of 7,300 during the period (see Table III-10) represents an increase of nearly 32 percent, while agricultural employment for the Valley declined

TABLE III-10

AGRICULTURAL AND NON-AGRICULTURAL EMPLOYMENT FOR TULARE COUNTY, 1960-1970 (1)
(annual average employment)

	YEAR						Percent Change
	1960	1962	1964	1966	1968	1970	1960-1970
Total Work Force	66,400	70,300	77,300	81,100	80,900	88,200	+ 32.79
Unemployment Rate (percent)	7.4	7.3	6.5	5.7	6.5	5.9	- 20.27
Total Employment	61,500	65,100	72,300	76,500	75,700	83,000	+ 34.95
Agriculture	23,100	25,900	29,500	29,900	27,600	30,400	+ 31.60
Manufacturing	4,600	4,600	5,100	5,600	6,200	7,000	+ 52.17
Non-Manufacturing	33,800	34,600	37,700	41,000	41,900	45,600	+ 34.91
Agricultural Services	1,300	1,300	1,600	1,900	1,600	2,500	+ 92.30
Mining	100	100	100	100	100	75	- 25.00
Contract Construction	2,300	2,200	2,400	2,200	1,900	1,860	- 21.74
Transp./Comm./Utilities	3,100	2,900	3,000	3,200	3,200	3,400	+ 9.67
Wholesale & Retail Trade	11,100	11,100	12,100	13,500	13,200	14,000	+ 12.61
Finance, Real Estate, Ins.	1,000	1,100	1,300	1,300	1,400	1,500	+ 50.00
Services	6,600	6,900	7,600	8,300	8,900	9,400	+ 42.42
Government	8,300	9,000	9,600	10,500	11,600	12,700	+ 53.01
Federal	600	600	600	600	800	800	+ 33.33
State & Local	7,700	8,400	9,000	9,900	10,800	11,900	+ 67.53

(1) Source: California Department of Human Resources

slightly. For the four-county area comprising the southern part of the Valley, the gain for the same period was only 8.8 percent. Both Fresno and Kings counties declined by approximately 3.5 percent and 17.5 percent respectively, while Kern County gained by nearly 17.6 percent. It should be noted that Tulare County's gain was due solely to an increase in hired labor because labor attributable to resident farmers and their families decreased by approximately 5 percent during the same period.

Agricultural employment gains in Tulare County can be traced to the addition of thousands of acres of land in agricultural production and to major increases in the number of acres in labor-intensive crops, particularly grapes and citrus. Almost all of this gain occurred during the period 1960-1966, and average annual agricultural employment has been relatively stable at approximately 30,000 the past five years. The gain during the 1960's has, to be sure, improved the income position of many farm labor families by offering employment opportunity for most of the year. But such improvement is short-lived in the face of drastic downward demands for farm labor which will result during the 1970's as mechanization takes over much of the labor requirement for the harvesting of grape, fruit, nut and vegetable crops. Such mechanization has been predicted for years, but its arrival during the 1970's is being hastened perhaps as much by the farm labor union movement as by the cost-price squeeze which has plagued agriculture in the San Joaquin Valley for more than a decade.

A substantial downward trend in agricultural employment will create serious economic problems within Tulare County even though such change may be desirable in the long-term. It is certain to increase welfare recipiency and local taxes unless county responsibility for partial financing of welfare services is shifted to state and federal levels. It is certain to perpetuate

sub-standard housing conditions in rural communities, and it is certain to intensify the host of social problems of low-income farm labor families. It is also certain therefore to magnify the already difficult task of developing and executing training programs for jobs in non-agricultural sectors of the economy.

The anticipated decline in agricultural employment will influence patterns of population distribution within the county. However, the total extent of rural-to-urban migration will be due only in part to the drying-up of employment opportunities on the farm; it will also continue to be influenced by the movement of young people who seek greater educational and employment opportunities in metropolitan areas of the state. The 1970 census substantiated this forecast and population shift.

Rural-to-urban migration occurs both outwardly and internally. Outward migration results in the loss of population to other areas of the state and nation, whereas internal migration results in a redistribution of people within the county without affecting total county population. Losses due to outward migration require a gain through natural increase plus some migration to the county from other areas just to maintain population at current levels. Thus, a net gain in total population depends (in addition to natural increase) first on the creation of a sufficient number of new jobs to nullify the effects of outward migration, and second on the creation of additional jobs to attract people to the county. During 1960-1970, the net gain in the county's population depended heavily on natural increase. Migration patterns from the county exceeded those to the county, resulting in a net migration of minus 1,355 people (Reference III-1).

An especially negative aspect of outward migration is that it tends to reduce the number of young residents who have completed high school and junior college programs, depriving the county of much of the talent required to fill jobs in agriculture and agri-business requiring higher levels of skill and training. Other communities often enjoy the advantage of acquiring skills and talent developed and paid for within Tulare County.

Larger communities of the county tend to be more attractive (or to at least offer more hope) for improving the income position and living conditions of the low-income family. Larger communities tend to become the focal point for education and job training services, health services, re-employment opportunity, and publicly-assisted low cost housing. An unfortunate aspect of this internal migration phenomenon is that the income position of many families has been improved more through welfare payments than through employment.

Changes in Owner-Operated Farms and Crop Patterns

A decline in the number of owner-operated farms has been a characteristic of Tulare County and California agriculture for several decades. From 1959 to 1964, the number of farms in Tulare County declined from approximately 6,150 to 5,500 -- a decrease of 10.14%. During the same period, the number of farms operated by full owners declined from 4,132 to 3,653 -- a decrease of 11.59% -- indicating that the decline in owner-operated farms has been faster than the decline in the number of farms. The average size of commercial farms increased during the period, from 262 acres to 296 acres.

These statistics as reported in the 1964 Census of Agriculture are partly indicative of the effects of the "cost-price squeeze" in agriculture -- i.e., the economic squeeze on the farmer caused by a decrease in net farm income relative to the value of farm products sold. The cost-price squeeze has

been particularly tight in counties of the San Joaquin Valley (including Tulare) which lead the state and the nation in value of agricultural production.

The cost-price squeeze has largely been responsible for the increase in the size of farms and the number of corporate operators. More and more of the value of agricultural production is being concentrated on fewer farms which are sufficiently large in acreage, capitalization and capacity for diversification to off-set to some extent the effects of the cost-price squeeze. In 1964, one-third of all commercial farms in Tulare County had total sales of farm products in excess of $40,000 and nearly 23% had sales in excess of $60,000. In terms of changes in the number of farms by economic class, only those in Class I ($40,000 and over) and Class VI (under $2,500) increased in numbers between 1959 and 1964. Farms in all other classes showed substantial decreases in number. The hardest hit group was the Class III farm which had sales between $10,000 and $20,000. In 1959, Class III farms represented nearly 22% of all commercial farms in the county. By 1964, there were 26.4% fewer farms in this class, representing only 17.6% of all commercial farms in the county.

Changes in the pattern of crops during the 1950's and 1960's contributed to what has been often characterized as the "golden age" of agriculture in the San Joaquin Valley. Cotton became the dominant field crop of the county in the 1950's and enjoyed more than a decade of dominance in value contributed to total production among field crops. In 1964, it was second only to fruit and nut crops in terms of value contributed by all crops. A large increase in acreage devoted to fruit and nut crops also occurred, due largely to citrus and vineyard plantings.

The future of Tulare County agriculture is somewhat in doubt because of uncertainties in market conditions, water supplies and the effects of crop damage from insect infestations and disease. Changes in crop patterns are already noticeable because of limitations on cotton acreage and the spectre of Pink Bollworm infestation which could wipe out cotton growers. Vegetable plantings are increasing and there has been a significant conversion to the production of livestock and livestock products. Grape plantings have also increased to the point where in 1970 grapes have become the county's major agricultural commodity, accounting for almost $72 million (17.6%) of the county's agricultural production. In terms of production value, changes in patterns between 1964 and 1970 showed substantial increases in vegetables (296%), fruit and nut crops (93%) and livestock and livestock products (68%), as compared to an increase of only slightly more than 16% in the field crop category.

These changes will continue in response to economic factors affecting farm production and will also continue to accelerate further increases in farm size and corporate operations and further decline in the number of owner-operated farms.

The Importance of Non-Agricultural Employment

From Tables III-10 and III-11, it can be seen that the 11-year increase in agricultural employment has been overshadowed by employment increases in non-agricultural activities. While agricultural employment increased nearly 32 percent, non-agricultural employment increased by nearly 37 percent -- a trend which is particularly significant in view of an anticipated decline in agricultural labor during the 1970's. While an increase of 2,400 manufacturing jobs representing only 17 percent of the total gain in non-agricultural employment, manufacturing jobs are basic to the creation of jobs in

other sectors of the economy and can be given the credit for most of the additional 11,800 jobs in non-agricultural activity. The exception would be jobs in government, since government employment tends to increase even without any rise in employment in other sectors of the economy.

Table III-11 shows the number of additional jobs created during 1960-1970 in non-agricultural activities in descending order of magnitude:

TABLE III-11

NUMERICAL RANKING OF EMPLOYMENT GAINS IN NON-AGRICULTURAL ACTIVITIES, TULARE COUNTY, 1960-1970(1)

Rank	Employment Sector	Employment Gain
1	Government (Local and State)	4,200
2	Wholesale & Retail Trade	2,900
3	Services (non-agricultural)	2,800
4	Manufacturing	2,400
5	Services (agricultural)	1,200
6	Finance, Real Estate & Insurance	500
7	Transportation, Communication & Utilities	300
8	Government (Federal)	200

(1) Derived from Table III-10.

During the first half of the 1970's, it is reasonable to expect that non-agricultural employment trends will continue similar to those experienced during the latter part of the 1960's, as a reflection of a general slowdown in economic expansion which has occurred nationally. However, employment gains for the latter 1970's and the 1980's are expected to surpass those of 1960-1970, with gains in non-agricultural activities off-setting a decline in agricultural employment.

Table III-12 shows employment projections to 1990 in the three broad categories of agriculture, manufacturing and non-manufacturing. Projections were consolidated into these three categories because of the relatively small size of the labor market and the consequent greater margin for error if a more refined set of categories is introduced.

TABLE III-12

EMPLOYMENT PROJECTIONS BY MAJOR EMPLOYMENT GROUP
TO 1980 AND 1990, TULARE COUNTY

Employment Group	1970	1980	Percent Change 1970-1980	1990	Percent Change 1980-1990
Agriculture	30,400	27,400	- 9.8	25,400	- 7.3
Manufacturing	7,000	10,200	+ 45.7	14,800	+ 45.1
Non-Manufacturing	45,600	60,800	+ 33.3	80,400	+ 32.2
Total Employment	83,000	98,400	+ 18.6	120,600	+ 32.7

Agriculture employment is expected to decline by 1990 to a point close to the level achieved in 1962. Manufacturing and non-manufacturing employment are expected to increase at rates slightly lower than during 1960-1970. Overall, total employment will increase at a decreasing rate for 1970-1980 and then increase at nearly the same rate between 1980 and 1990 as occurred during 1960-1970. Translated into jobs, agricultural labor would decrease at the average rate of 250 jobs per year; manufacturing would gain at the average rate of 390 jobs per year; and non-manufacturing would gain at the average rate of 1,160 jobs per year. These gains in manufacturing and non-manufacturing compare with 1960-1970 average gains of 218 and 1,073 jobs per year respectively. The percentage and numerical gains for 1970-1990 are very judgemental. They assume fairly high levels of employment, but they seem reasonable considering the increasingly more important role which the San Joaquin Valley has assumed over the past 20 years as part of

the total California economy. The extent of decline in agriculture may be conservative in view of the cost-price squeeze affecting farm operations and the push to further reduce labor costs through greater application of mechanized techniques of planting, maintaining and harvesting crops.

The Potential for Economic Expansion

The potential for economic expansion within the county depends on a variety of direct and indirect factors of both an internal and external character. This section is intended to identify some of the more important factors which could act to either enhance or reduce levels of economic activity and thus change significantly one or more of the components of projection discussed previously.

Certainly a most important factor to be considered is the proposed development of the Mineral King area of the Sequoia National Forest. Located 25 miles southeast of the community of Three Rivers on the East Fork of the Kaweah River, the Mineral King development has been estimated as having as high as a $75 million annual impact on the county. At this point, it is reasonable to be conservative on potential economic impact, particularly since there is considerable uncertainty as to the level and intensity of development which ultimately may be permitted. Whether the current proposal of the U. S. Forest Service survives a test before the U. S. Supreme Court or not, it is reasonable to expect that a significant level of recreation development will take place at Mineral King during the 1970's, although at perhaps a scaled-down level from that originally proposed by Walt Disney Enterprises.

While the Mineral King proposal has been the central topic of recreation development interest during the past four years, there are other opportunities for attracting high levels of recreation and tourism activity within

the county which could combine to have a major impact on the local economy. The depth and breadth of scenic quality and natural environment within the county is enormous. Within the past decade, the natural scenic attractions of the county have received increasing attention and demand by California's metropolitan area residents. This attention will be further heightened with the completion of major freeway construction (Interstate 5, Highway 198 and Highway 65) and the Eastside Division of the Central Valley (water) Project. The latter project will include the huge Hungry Hollow reservoir in the foothills southeast of Porterville which is certain to become a major attraction for boating enthusiasts within populous Southern California.

The realization of economic potential from recreation attraction will depend in part on their being developed a compatible set of policies and programs by the county which seek to maximize tourism and recreation consistent with the need for careful management of the county's natural resources. Furthermore, it will require an integrated intergovernmental approach to assure that interregional transportation facilities will be provided on alignments which will open up areas of recreation potential while respecting environmental qualities. Three such facilities having significance in this regard are the proposed "Eastside Freeway", the proposed extension of State Highway 190 across the Sierra to Inyo County, and the proposed Sierra Scenic Way.

The southern section of the Eastside Freeway is State Highway 65, extending from Highway 99 north of Bakersfield along the Sierra foothills into Tulare County and terminating at Woodlake. The central and northern sections are not yet constructed but are shown on the California Freeway and Expressway System, following an alignment generally along the east floor of the San Joaquin Valley and linking with Interstate 80 east of Sacramento. If this facility is to maximize its economic contribution to Valley counties (in-

cluding Tulare), its alignment must be planned as an interregional facility and not as simple county-by-county extensions of State Highway 65. Properly located, the Eastside Freeway would provide access to a chain of 20 reservoirs in the foothills and could become one of the most important scenic highways in the State.

The Sierra Scenic Way was proposed initially by the Southern California Automobile Club as a 300 mile scenic highway from Mojave to Mariposa. It would utilize existing portions of state highways, forest and logging roads, and county roads, with only short sections of new alignment required. This proposal has particular merit if handled sensitively in consideration of existing lumbering, mining and cattle operations. While proposed only as a scenic highway, lateral roads providing access to areas of recreation potential (and development of such areas) would greatly expand the accessibility of mountain recreation areas without intruding on fragile back country areas. Under such a development concept, the highway would relieve pressures on existing ever-used national forest and national park areas which currently are only accessible from a few highways extending east from the Valley floor.

FUTURE URBAN LAND REQUIREMENTS

Future land requirements for communities included in the study have been estimated based on the analyses contained in Chapter II, on projections of population presented in this chapter, and on data developed by the consultant for comparable communities within other counties of the San Joaquin Valley. At best, the estimates are general in that they were developed without the benefit of historical data on economic activity and land use. The estimates are shown in Table III-15.

No additional land requirements are shown for communities which are expected to decline or remain relatively stable in population. However, some additional land for industrial use has been indicated on some of the community sketch plans which are shown on the water and sewer plans presented in Chapter VIII as a hedge against possible expansion of existing industries or the location of new industries related to agriculture.

Cities and communities requiring additional land for urban expansion are included in the following list:

Exeter	Earlimart
Farmersville	Goshen
Lindsay	Pixley
Woodlake	Springville
Camp Nelson	Three Rivers
Cutler-Orosi	

All of these communities had a 1970 population of 1,000 or more and are expected to realize increases by 1990 of 300 or more. Other communities which are expected to increase in population (Ducor, Elderwood, Lemon Cove, London, Richgrove, Strathmore, Terra Bella, Tipton) either have sufficient vacant land within the existing development pattern or the projected population increase is

TABLE III-13

NET ACRES OF LAND PER 1,000 POPULATION, 1970, FOR COMMUNITIES WITH 1970 POPULATION OF 1,000 OR MORE

City or Community	Land Use Category				
	Residential	Commercial	Industrial	Public (1)	Total
Exeter	62.2	12.1	10.5	15.5	96.1
Farmersville	51.0	6.0	4.1	6.9	68.0
Lindsay	53.3	9.4	16.2	17.5	96.4
Woodlake	80.5	9.5	4.0	33.1	127.2
Camp Nelson	161.7	12.6	0.9	4.7	179.9
Cutler-Orosi	66.9	8.0	12.0	12.1	98.9
Earlimart	43.1	9.8	9.4	15.7	78.1
Goshen	96.6	15.4	57.1	44.9	214.0
Pixley	93.4	19.3	21.2	37.3	171.2
Richgrove	23.3	5.4	18.6	15.7	63.0
Springville	25.0	13.0	0.7	16.0	54.7
Strathmore	120.5	17.5	22.8	22.9	183.7
Terra Bella	83.7	14.8	81.7	16.3	123.0
Three Rivers	481.0	179.0	.0	394.0	1,054.0

(1) Does not include streets.

TABLE III-14

COEFFICIENTS OF URBAN LAND REQUIREMENTS FOR
COMMUNITIES WITH PROJECTED ADDITIONAL POPULATION OF 300 OR MORE BY 1990
(acres/1,000 population added) (5)

City or Community	Land Use Category				
	Residential(1)	Commercial (1)	Industrial (2)	Public & Other (3)	Total (4)
Exeter	75.0	14.0	30.0	80.0	199.0
Farmersville	65.0	10.0	20.0	100.0	195.0
Lindsay	80.0	14.0	30.0	80.0	204.0
Woodlake	80.0	14.0	20.0	100.0	214.0
Camp Nelson	200.0	14.0	--	100.0	314.0
Cutler-Orosi	80.0	12.0	30.0	80.0	202.0
Earlimart	60.0	18.0	40.0	60.0	178.0
Goshen	80.0	18.0	80.0	60.0	238.0
Pixley	80.0	18.0	40.0	60.0	198.0
Springville	60.0	14.0	20.0	60.0	154.0
Three Rivers	160.0	30.0	--	100.0	250.0

(1) Net acres plus 25 percent for choice.

(2) Net acres plus 50 percent for choice.

(3) Includes streets, recreation, schools, government offices, semi-public.

(4) Gross acres.

(5) Example, if Exeter adds 3,000 people by 1990, 75 x 3 = 225 more residential acres will be required by that time; 14 x 3 = 42 acres, Comm.; 30 x 3 = 90 acres, Industrial; 80 x 3 = 240 acres public; or 199 x 3 = 597 total acreage added/1,000 population increase.

TABLE III-15

URBAN LAND REQUIREMENTS, 1980, 1990, FOR COMMUNITIES WITH PROJECTED POPULATIONS OF 1,000 OR MORE
(acres)

City or Community	Additional Acres Required									
	Residential		Commercial		Industrial		Public & Other		Total	
	1970-1980	1980-1990	1970-1980	1980-1990	1970-1980	1980-1990	1970-1980	1980-1990	1970-1980	1980-1990
Exeter	70	75	13	14	27	30	72	80	180	200
Farmersville	100	120	15	18	30	37	146	183	285	357
Lindsay	190	240	34	42	72	90	190	240	490	612
Woodlake	170	195	30	34	43	49	216	243	462	520
Camp Nelson	85	80	6	6	--	--	42	40	133	126
Cutler-Orosi	160	90	24	14	60	34	160	91	404	230
Earlimart	13	12	4	4	8	8	12	12	32	32
Goshen	45	45	10	10	43	43	32	32	129	129
Pixley	25	16	6	4	13	8	19	12	63	40
Springville	12	12	3	3	4	4	12	12	31	31
Three Rivers	120	315	23	59	--	--	77	197	193	493

too small to warrant calculation of space requirements. In communities which are expected to remain fairly stable in population, some additional land may be required if existing patterns of blight remain or if existing services are relocated. This would also be true for communities where population decline is anticipated. However, no external expansion would be required because sufficient vacant land exists within the existing development pattern.

The amount of land required for the expansion of cities and communities varies in relation to such factors as: (1) the economic role of the community in the county and sub-planning area; (2) size of population, quality and character of the existing development pattern; (3) levels of service now provided to meet the needs of the community population; and (4) the strategic geographic location in the area and region. These factors are expressed in Table III-14 in terms of the number of acres required for each major category of urban use per thousand population added to the community in the future (acres/1,000). This ratio also reflects additional percentages for choice in the selection of sites for major uses in order to provide reasonable flexibility in land development. Future land requirements are shown in Table III-15.

Table III-13 indicates the current ratio of acres/1,000 people for existing land use. The range of 62 acres to 80 acres of residential land per thousand people in the community as shown for the four cities provides a good basis for comparing other communities. Generally, a ratio above 80 acres/1,000 indicates a much lower residential density and open character of the community. Conversely, a ratio below 62 acres/1,000 indicates smaller lots and a more tightly knit community pattern.

COMMUNITY DEVELOPMENT SKETCH PLANS

The community development sketch plans described in this section provide the basis for short and long-range plans for water and sewer service. The sketch plans are presented graphically in Chapter VIII as part of the water and sewer plan diagrams. They are not intended to serve as "General Plans" for the communities, but rather to indicate the general magnitude and location of future growth and development in consideration of planning and engineering factors presented in various chapters of this report. These factors include: existing development policy; capability for expanding (or providing) water and sewer service; and both the constraints and opportunities which exist for accommodating future growth -- thus the term "sketch plans".

With the exception of the four cities, General Plans have not been prepared for the many communities included in the study. General Plans for Lindsay, Exeter, Farmersville and Woodlake were prepared as part of the Tulare County Area General Plan program during the early 1960's. Policies of those plans generally have remained valid and are reflected in the sketch plans described in this section. Policies have been modified, as reflected in the sketch plan diagrams and descriptions, only to the extent that change is required as the result of changes in future prospects for population growth and economic activity covered previously in this chapter and Chapter II.

For the unincorporated communities, the sketch plans, together with the water and sewer plans, will provide the framework for the preparation of more detailed and comprehensive general plans as the need develops. Some of the communities are so small that there is no particular urgency which demands early preparation of general plans. In cases such as Earlimart, Pixley and Cutler-Orosi, their size and complexity of problems insists on early effort to formulate general plans which will treat more completely the range of land

use, circulation, public facility, housing and conservation needs of the community.

Communities for which sketch plans have been prepared and described in this section include the cities of Exeter, Farmersville, Lindsay and Woodlake, and the unincorporated communities of Camp Nelson, Cutler-Orosi, Earlimart, Goshen, Pixley, Springville, and Three Rivers. The sketch plan for Three Rivers was prepared by the staff of the County Planning Department as a by-product of the Department's current general plan program for the Kaweah Watershed and the Three Rivers community. These cities and communities had a 1970 population of 1,000 or more and are expected to realize increases by 1990 of 300 or more.

Other communities which are expected to increase in population are Ducor, Elderwood, Lemon Cove, London, Richgrove, Strathmore, Terra Bella and Tipton. However, the expected increases generally are so small that they can be absorbed by the development of vacant lands within the existing development patterns of those communities. For those communities where population is expected to remain fairly stable or to decline (see Table III-8), water and sewer plans have been prepared based on population figures shown in Table III-9 -- i.e., assuming no appreciable decline -- as a hedge against declines occurring as indicated in Table III-8.

THE EXETER COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Exeter Community Planning Area reflects population projections of 6,400 by 1980 and 7,400 by 1990, and the following constraints and opportunities affecting future growth:

1. High value permanent crops surround the city and limit the feasibility of significant urban expansion. Such lands are generally designated as agricultural preserves and thus protected from developments.
2. An unmet housing demand generated by people of moderate income who work in industries within the Exeter area but who now live in other communities within the Visalia-Woodlake Sub-Planning Area.
3. Limitations of the existing sewer system which, when combined with the influence of permanent crop patterns and a moderate income housing demand, suggests that most residential expansion will occur west and southwest of the community.
4. The opportunity for highway commercial development at interchanges with Freeway 65 when the freeway is constructed east of the community.
5. The opportunity for industrial development along the east side of Freeway 65 adjacent to the Visalia Electric Railroad Line.
6. The physical setting and general attractiveness of the community adjacent to the Sierra Foothills and close to foothill and mountain recreation areas.
7. Periodic flooding from Yokohl Creek in northeast Exeter.

Proposals of the Sketch Plan

The principal proposals of the sketch plan are:

1. Residential expansion primarily to the southwest and west.
2. A strict limitation of residential expansion to the east to avoid residential encroachment on areas having industrial potential or subject to flooding.
3. Commercial development along Visalia Road to the west and along Kaweah Avenue to the South (mostly commercial service).
4. Highway commercial development at Marinnette and Firebaugh Avenue Interchanges with Freeway 65.
5. Retail commercial primarily as an expansion of the Central Business District.
6. Industrial development along railroad rights-of-way northwest and east of the community. Twice as much land is shown for industrial development than is indicated by future land requirements shown in Table III-15 to reflect the option for industrial development along the east side of Freeway 65. Industrial development east of the Freeway should occur, however, only if sewer service is provided to the area and the area is protected from flooding.

THE LINDSAY COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Lindsay Community Planning Area reflects population projections of approximately 10,400 by 1980 and 13,300 by 1990, and the following constraints and opportunities affecting future growth:

1. Location along Freeway 65 close to foothill and mountain recreation areas which in time will add a highway commercial and recreation service orientation to the community.
2. An excellent physical setting and generally good physical character.
3. Extensive permanent crop patterns surrounding the community (except to the north and northeast).
4. An extensive residentially developed urban fringe to the northeast requiring connection to water and sewer systems in order to protect ground water quality and permit further residential expansion.
5. Vacant land along the Santa Fe Railroad and Mirage Avenue south of the community available for industrial expansion.
6. Periodic flooding from Lewis Creek in northeast Lindsay.

The Proposals of the Sketch Plan

The principal proposals of the sketch plan are:

1. Residential expansion primarily to the north, northeast and east in the vicinity of elementary and high school sites in the area, assuming that protection from flood hazards is provided.
2. Retail-commercial expansion primarily within the Central Business District (not shown on sketch plan).

3. Service commercial expansion along Formosa Street (west) and Fresno Street (west).
4. Highway commercial development of future interchanges of Freeway 65 with Lindsay Blvd. (south) and Tulare Road (northwest).
5. Industrial expansion along the Southern Pacific Railroad and Lindmore Street south of the community.

THE FARMERSVILLE COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Farmersville Community Planning Area reflects population projections of approximately 5,400 by 1980 and 7,300 by 1990, and the following constraints and opportunities affecting future growth:

1. A fragmented pattern of community development.
2. A high percentage of dilapidated and deteriorated housing.
3. A dominant influence of the nearby Visalia urban area which acts to discourage location of high quality residential and retail-commercial development.
4. Permanent crop areas limiting development west of Shasta Avenue (west) and south of Visalia Road (southeast).
5. Availability of water and sewer service.
6. An under-employed labor force capable of being trained for employment in industries which might locate in the area.
7. Land held as agricultural preserves.

Proposals of the Sketch Plan

The principal proposals of the sketch plan are:

1. Residential expansion primarily to the southwest and north-northeast.
2. The filling in of vacant lands within existing residential areas and the replacement of substandard housing with adequate housing prior to any substantial outward residential expansion.
3. Commercial expansion west and east along Visalia Road, the filling in of vacant commercial parcels along Farmersville Blvd., and the remodeling or renewal of commercial properties along Farmersville Blvd.

4. Industrial development along the Southern Pacific Railroad north and northeast of the community and along the north side of Visalia Road east of the community.

THE WOODLAKE COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Woodlake Community Planning Area reflects population projections of approximately 5,800 by 1980 and 8,200 by 1990, and the following constraints and opportunities affecting future growth:

1. An attractive physical setting at the base of the Sierra Foothills and close proximity to the Kaweah Lake Recreation Area.
2. Substantially improved access to the community to be available with the extension of Highway 65 as a freeway west of the community.
3. A well defined and concentrated Central Business District.
4. Periodic flooding from Antelope Creek (west and northwest).
5. Substantial area available for residential expansion without encroaching on permanent crop areas in the vicinity.
6. Opportunity for attracting highway commercial development upon completion of Freeway 65.
7. Opportunity for attracting industrial development in the vicinity of future Freeway 65 and the Santa Fe and Visalia Electric Railroads.
8. Land held as agricultural preserves.
9. Uncertain water supply.

Proposals of the Sketch Plan

The principal proposals of the sketch plan are:

1. Residential expansion primarily to the north and east.
2. Residential development to the west and north is predicated on the assumption that periodic flooding from Antelope Creek will be controlled.

3. Substantial renewal of existing blighted housing areas prior to substantial outward urban expansion on vacant lands.
4. Retail commercial expansion will be confined within the Central Business District.
5. Service commercial developments located on the north side of Naranjo Blvd. (east) and along the north side, west of the proposed future alignment of Freeway 65.
6. Highway commercial development north of Noranjo Blvd. and west of the Freeway 65 Interchange.

   Note: Highway commercial development adjacent to the Interchange area should be deferred until final design of the Interchange.
7. Industrial development along Noranjo Blvd. and Ropes Avenue, adjacent to the Santa Fe and Visalia Electric Railroad, west of town.

   Note: Industrial development adjacent to the Freeway Interchange should be deferred until final interchange design.

THE CAMP NELSON COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Camp Nelson Community Planning Area reflects population projections of 1,500 by 1980 and 1,900 by 1990, and the following constraints and opportunities affecting future growth:

1. A setting of high scenic attraction within middle elevation reaches of the Tule River watershed.
2. A narrow river valley confined by the Tule River on the south and steep slopes on the north, but with substantial acreage available for urban-type development on slopes of less than 20 percent.
3. Soil, geologic and vegetative conditions which insist on high levels of sewage treatment to meet regional water quality control standards.
4. The need to eliminate individual septic tank and effluent disposal systems at an early date as a condition precedent to further recreation-home and resort development in the community.
5. Fragile ecology of the natural landscape which requires sensitive design of roads and lots, careful building placement and measures to avoid erosion and destruction of vegetative cover.
6. An existing road and lot pattern which is characterized in many locations by difficult circulation, inadequate access, and insufficient sized parcels for the terrain.
7. An opportunity to introduce and preserve open space within the developed area, preserve river frontage, reduce fire hazards and assure a natural atmosphere within a developed area which provides linkages with the surrounding natural environment.

8. A substantial number of vacant lots available for development prior to further subdivision in the area.
9. Inadequate design of Highway 190.
10. Fire hazard.
11. Uncertain water supply.

Proposals of the Sketch Plan

The principal proposals of the sketch plan are:

1. Residential development primarily on vacant lots within existing subdivided areas, prior to outward expansion of the community. Existing vacant lots could accommodate 60 percent - 70 percent of the population increase anticipated by 1990, assuming that some of the smaller lots are consolidated into larger parcels. Since there are more vacant lots available than are likely to be needed by 1980, proposals for residential development on vacant lots for 1970-1980 and 1980-1990 should be considered interchangeable.
2. The assembly and maintenance of vacant lots in key locations and river frontage to introduce and preserve open space within the community for the benefit of existing and future residents. This concept is shown diagrammatically on the sketch plan and is to be interpreted with considerable flexibility as to which combinations of lots and river frontage should be held for open space. Open space should be provided as part of the design of subdivisions which may be developed in the future.
3. Outward residential expansion (new subdivisions) during the 1980-1990 decade is proposed at both the east and west-central areas of the community.

4. Retail commercial which caters primarily to the convenience-goods and personal service requirements of local residents and lodging and related commercial which caters to the needs of tourists is proposed primarily near the western end of the community. Commercial proposals should be considered as illustrative of desirable locations for such development, recognizing that flexibility in location is needed because of uncertainties in the scale of commercial development which may occur and limitations of terrain. Generally, commercial development should be located so as to avoid congestion within developed areas, permit concentration of facilities for the convenience of residents and minimize costs of water and sewer service.

5. A majority of the undeveloped acreage along the Tule River should be acquired and maintained as public recreation area for the convenience of the traveling public as part of an overall program of resource management along the river.

6. A strict prohibition against industrial operations and a strict limitation on commercial service operations to provide only for such necessities as automobile service and repair and building and hardware supplies.

THE CUTLER-OROSI COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Cutler-Orosi Community Planning Area reflects population projections of nearly 7,300 by 1980 and 8,400 by 1990, and the following constraints and opportunities affecting future growth:

1. The community is surrounded by land included within agricultural preserves, leaving primarily the land between Cutler and Orosi available for urban expansion.
2. Undeveloped land between Cutler and Orosi is subject to flooding from Sand Creek during years of heavy runoff.
3. The population of the Cutler-Orosi community is likely to grow sufficiently to permit unification of the urban pattern over the next 20 years.
4. The location of the Santa Fe Railroad spur at the southern boundary of the Cutler-Orosi community permits the encouragement of industry in conjunction with the railroad without encroachment on residential areas of the community.
5. A seven-fold increase in the number of dilapidated housing units during the 1960-1970 decade.
6. An under-employed labor force sufficiently large and concentrated to encourage industrial development.

Proposals of the Sketch Plan

The principal proposals of the sketch plan are:

1. The replacement of dilapidated housing units within the existing urban development pattern prior to significant urban expansion between the Cutler and Orosi communities.
2. The unification of the Cutler-Orosi urban pattern through residential expansion between the two communities. Such

unification should be discouraged, however, until adequate measures have been taken to control flooding along Sand Creek as recommended in the Flood Control Master Plan of the Tulare County Flood Control District.

3. The extension of existing commercial centers in Cutler and Orosi, with commercial development between the two communities being delayed until resolution of the flood control problem.

4. Industrial development along the Santa Fe Railroad spur between Cutler and the Cutler-Orosi sewer treatment plant. This location is preferred in order to avoid encroachment of industrial use on residential areas and to permit low cost provision of sewer service to industrial areas. Because future industrial development can be easily concentrated in this area, all land proposed for future industrial development, as enumerated in Table III-4, should be made available here either during the 1970-1980 or 1980-1990 decade.

THE EARLIMART COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Earlimart Community Planning Area reflects population projections of 3,300 by 1980 and 3,500 by 1990, and the following constraints and opportunities affecting future growth:

1. Location along Freeway 99 and the mainline Southern Pacific Railroad.
2. Split community development pattern created by the alignment of Freeway 99 and the railroad.
3. An existing sewer system.
4. A high percentage of substandard housing (61.7 percent).
5. Substantial vacant land available within the urban pattern for accommodating new housing.
6. Land held as agricultural preserves.

Proposals of the Sketch Plan

The principal proposals of the sketch plan are:

1. The replacement of dilapidated housing units within the urban pattern prior to encouraging outward physical expansion of the community.
2. Concentration of residential development east of Freeway 99, to minimize the extent of freeway crossing required by residents west of Freeway 99, particularly by school children.
3. Commercial development as an expansion of the existing commercial center and at freeway interchanges.
4. Industrial expansion along the west side of the freeway and along the Southern Pacific Railroad.

THE GOSHEN COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Goshen Community Planning Area reflects population projections of 1,860 by 1980 and 2,400 by 1990, and the following constraints and opportunities affecting future growth:

1. Location along Freeway 99 and the mainline Southern Pacific Railroad.
2. A community development pattern divided both by the freeway and the railroad.
3. Sixty-two percent of the housing units in a substandard condition.
4. Considerable opportunity for industrial development because of the community's proximity to the West Visalia Industrial Park area, Freeway 99 and the railroad.
5. An under-employed labor pool capable of meeting labor requirements of many types of industry which could locate in the area.
6. Reasonable proximity to the Visalia sewer treatment plant south of the community, permitting early development of sewer service to the community.
7. A dominant influence of Visalia in meeting retail trade requirements of the community.

Proposals of the Sketch Plan

The principal proposals of the sketch plan are:

1. Residential development within the existing community pattern, replacing substandard housing prior to outward expansion.
2. A strict limitation of residential expansion to the east and south to avoid encroachment on areas having industrial potential.

3. Commercial development primarily at freeway interchanges.

4. Industrial development south and east of the community (all east of Freeway 99) as part of the West Visalia industrial area.

THE PIXLEY COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Pixley Community Planning Area reflects population projections of 1,900 by 1980 and 2,100 by 1990, and the following constraints and opportunities affecting future growth:

1. Location along Freeway 99 and the mainline Southern Pacific Railroad.
2. Bi-section of the community by both the freeway and the railroad.
3. Nearly 66 percent of all housing is substandard.
4. Water and sewer service available to the community.
5. Substantial vacant land within the existing urban pattern to accommodate future growth.
6. An under-employed local labor force available for most industries which might locate within the area.
7. Occasional flooding from overflows of Deer Creek and its tributaries.
8. Land held as agricultural preserves.

Proposals of the Sketch Plan

The principal proposals of the sketch plan are:

1. Residential expansion wholly within the existing urban pattern through replacing substandard housing and the filling-in of vacant parcels.
2. Commercial development as an expansion of existing commercial areas and at the Park Avenue Interchange with Freeway 99.
3. Industrial development along the Southern Pacific Railroad and south of Bella Avenue in the southwest part of town.

THE SPRINGVILLE COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Springville Community Planning Area reflects population projections of 1,700 by 1980 and 1,900 by 1990, and the following constraints and opportunities affecting future growth:

1. A long and narrow community development pattern strung out along State Highway 190 and the Tule River, with substantial vacant land available within the existing community pattern.
2. A good community setting in relation to mountain recreation areas to the north and east.
3. Limited potential for industrial employment.
4. Some potential for highway and tourist commercial development.
5. Uncertainties concerning the future economic base of the community.
6. Considerable flood hazard along the north bank of the Tule River.
7. Possible limitation to sewer service due to location of the plant in the flood plain.

Proposals of the Sketch Plan

The principal proposals of the sketch plan are:

1. Residential development in that part of the community which is upstream and above the elevation of the sewage treatment plants.
2. Discouragement of development within the intermediate flood plain.
3. Discouragement of residential development south of the Tule River and west of the Rodeo grounds except on existing subdivided vacant parcels.

4. Commercial and industrial development along State Highway 190 east of the sewage treatment plant and Rodeo grounds.

THE THREE RIVERS COMMUNITY PLANNING AREA

Constraints and Opportunities for Future Growth and Development

The sketch plan for the Three Rivers Community Planning Area reflects population projections of approximately 2,000 by 1980 and 4,000 by 1990, and the following constraints and opportunities affecting future growth:

1. An elongated, fragmented pattern of existing community development located in several concentrations along State Highway 198 and the Kaweah River.
2. An excellent physical setting which in itself constitutes an attractive area for recreation, retirement and permanent residence.
3. Close proximity to the Kaweah Lake recreation area and recreation areas in the Sierra National Forest and Sequoia National Park, as well as the Mineral King wilderness area.
4. Lack of central water supply and sewer systems to serve the community.
5. Extensive flood hazards within the flood plain of the middle fork, north fork and south fork of the Kaweah River. Floods which have occurred since the construction of Kaweah Dam below the community have caused extensive damage to developed areas along the Kaweah River and State Highway 198.
6. Problems caused by relocation of Highway 198.
7. Increasing numbers of tourists who may use this community as a wayside stop or a jumping off place for nearby State and Federal recreation areas.

Proposals of the Sketch Plan

1. Residential growth to continue at the low density rate of .4 dwelling units per acre.

2. No additional subdivided lots until year 2000 unless major tourist center is developed as a result of proposed Mineral King development.
3. Encouragement of increased public park and recreation facilities.
4. Retail and service commercial facilities developed along Highway 198 adjacent to existing golf course.
5. Minimal commercial or residential additions until public sewer and water systems installed.

MAJOR DEVELOPMENT ISSUES

The major development issues facing communities included in the study have been described in Chapter 2. It is particularly important to emphasize, however, that the major development issues for many communities are population decline, high percentages of substandard housing, and the absence (and unliklihood of future provision) of the range of urban services and facilities required by the resident population. The combination of these three broad issues raises serious questions concerning the advisability of providing water or sewer services to some of these communities even if financing were to be provided through a 100 percent grant. The efficacy and justification of providing water and sewer service goes well beyond the need for these companion services and embraces the broader question of how to improve the quality of life for thousands of people trapped in communities which lack economic and social viability sufficient to justify their very continuation in the future.

Lack of water and sewer service is but one set of criteria to be considered. The totality of social, economic, physical, cultural and esthetic deprivation which exists in varying degrees in many communities, and its consequent impact upon the people of those communities, is the authentic issue! Will the interests of thousands of people be served by the provision of a single service, such as water and sewer, when there is no hope for providing the remaining services which are essential if their quality of life is to have reasonable parity with that enjoyed by the majority of people in the county? To provide water and sewer service to many communities when there is so little hope of achieving reasonable parity in housing, health care, police protection, fire protection, employment, education, cultural opportunity, entertainment, and other areas of human need, is to lock-in community residents to a dismal future and further, and perhaps permanently, foreclose opportunities for ever achieving such parity.

Clearly, the funding of water and sewer facilities must be accomplished in such a manner as to be a positive force in behalf of residents of communities. But the problems posed above for certain communities also insist that a broader program be developed to cope with the range of problems posed than merely denying some communities access to funds for the development of water and sewer systems. This subject is discussed more fully in Chapter IX, under the subject of plan implementation.

CHAPTER FOUR

EVALUATION OF EXISTING WATER SUPPLY SYSTEMS

CHAPTER IV

EVALUATION OF EXISTING WATER SUPPLY SYSTEMS

INTRODUCTION

Purpose and Scope

Increasing demands for water for municipal and industrial needs, agricultural needs, and recreational purposes make it necessary to evaluate current sources of water, production facilities, distribution facilities, quality data, and general considerations in approaching the planning of supplies and facilities to meet future needs.

Data presented in this portion of the report will indicate well and pump information, ground water data, surface water data, information on distribution, storage, treatment and facilities, population served and water production.

The area included in this report includes all of Tulare County except the cities of Dinuba, Porterville, Tulare and Visalia and their unincorporated fringe areas. The evaluations of water systems serving these communities are found in separate reports.

General Historical Information

Shortly after the middle of the 1800's, Tulare County development turned its major focus toward agricultural and agriculturally-related municipal, industrial and domestic resource support systems. Initially, the area was dry-farmed and little use was made of surface supplies of water flowing in the several streams passing through the county from the Sierra Nevada mountains in a westerly direction toward Tulare Lake.

The next phase in development included the construction of crude diversion works in the major streams, such as the Kaweah River and the Tule River. The water was backed-up in the channels so that it could flow by gravity in canals to areas which were closely adjacent to the rivers. Such facilities were generally limited to foothill areas and within the vicinities of Visalia and Porterville. These early irrigation developments, coupled with their locations on the original trails and roads, through the San Joaquin Valley, led to the establishment of Visalia, the county seat, and Porterville as the main population centers in Tulare County. Subsequent railroad construction, brought about the development of Tulare and several other population centers.

The utilization of centrifugal pumps, shallow and deep-well, brought the underground water supplies into great importance. The development of large areas became feasible, at least temporarily, largely through reliance on withdrawal of water from the underground reservoir replenished by runoff from the Sierra Nevada mountain precipitation and snow pack. Extensive development of lands requiring irrigation quickly brought about the withdrawal of water in excess of the safe yield from the ground water replenishment sources. This drain led to critical water supply situations in several areas within Tulare County, particularly in the 1930's and 1940's, during years of extremely low natural inflows.

The construction of the Friant-Kern Canal of the Central Valley Project, placed in service in 1949 and 1950, generally brought stability in water conditions in the service areas of those districts which had contracted for water supplies. This additional supply has served to stabilize water conditions at suitable levels for several substantial urban areas as well as large agricultural service areas. The Friant-Kern Canal supplies, however,

have not been sufficient to meet all overdrafts and serious water shortage conditions in several parts of Tulare County.

TABLE NO. IV - 1 (1)

STREAM FLOWS (in Acre Feet)

Year	Kaweah River	Sand Creek	Cottonwood Creek	Limekiln Creek	Yokohl Creek	Lewis Creek	Tule River	Deer Creek	White River	Rag Gulch
1889-90	1,100,000	5,928	21,038	32,782	17,400	2,930	163,000	22,500	5,625	1,350
1891	509,000	3,344	11,963	19,492	10,150	1,519	97,000	9,500	2,375	570
92	648,000	4,864	17,738	27,466	14,500	2,387	130,000	16,100	4,025	966
93	607,000	3,800	13,613	22,150	11,600	1,736	109,500	11,300	2,825	678
94	399,000	3,344	11,963	19,492	10,150	1,519	127,700	9,600	2,400	576
95	733,000	8,360	29,700	46,515	23,925	4,449	221,500	39,500	9,875	2,370
96	340,000	3,800	13,200	21,264	10,875	1,736	119,800	10,400	2,600	624
97	445,000	6,384	23,100	35,440	18,850	3,255	177,200	26,900	6,725	1,614
98	223,000	1,824	6,600	10,632	5,438	651	51,700	4,100	1,025	246
99	307,000	2,584	9,488	15,505	7,975	1,085	49,800	6,500	1,625	390
1899-00	317,000	3,040	11,138	18,163	9,425	1,411	44,700	8,500	2,125	510
01	697,000	5,928	21,038	32,782	17,400	2,930	161,100	33,500	5,625	1,350
02	344,000	4,104	14,438	23,036	12,325	1,953	105,000	15,800	3,950	948
03	413,000	4,104	14,438	23,036	12,325	1,953	112,000	15,800	3,950	948
04	375,000	4,400	15,670	24,800	12,680	2,060	95,170	9,600	2,400	576
05	345,000	3,650	13,200	21,300	10,880	1,730	104,690	17,600	4,400	1,056
06	1,104,000	21,000	77,000	110,000	58,800	11,700	469,420	88,500	22,125	5,310
07	600,000	8,208	28,875	44,743	23,200	4,230	207,440	27,600	6,900	1,656
08	256,000	2,580	8,660	15,500	7,750	1,080	110,160	12,300	3,075	738
09	802,000	12,160	40,425	64,235	32,625	6,075	388,620	76,200	19,050	4,572
1909-10	409,000	5,101	18,150	28,400	14,900	2,500	154,900	17,100	4,275	1,026
11	546,000	7,140	25,600	39,900	20,650	3,700	149,210	16,200	4,050	972
12	207,000	1,210	7,200	11,950	5,800	650	65,850	9,000	2,250	540
13	221,000	2,170	8,250	13,300	6,520	860	38,440	6,900	1,725	414
14	487,000	4,710	21,900	33,200	17,750	3,040	166,970	25,800	6,450	1,548
15	370,000	4,400	15,670	33,200	12,680	2,060	139,720	19,000	4,750	1,140
16	762,000	11,400	38,400	24,800	30,100	5,750	348,360	58,500	14,625	3,510
17	471,000	5,600	20,600	60,300	16,700	2,800	182,040	19,100	4,775	1,146
18	228,000	2,170	8,250	13,300	6,520	860	52,580	7,200	1,800	432
19	259,000	2,880	10,320	16,860	8,700	1,190	77,660	11,200	2,800	672
1919-20	350,000	4,860	17,750	27,900	14,500	2,280	114,040	14,100	3,525	846
21	348,000	4,100	14,860	24,900	12,340	1,950	92,160	11,400	2,850	684
22	461,000	5,320	19,800	30,600	16,000	2,720	143,140	16,500	4,125	990
23	363,000	3,950	14,480	23,500	11,600	1,880	104,270	14,100	3,525	846
24	102,000	150	800	2,660	500	N.A.	24,820	4,600	1,150	276
25	326,000	3,650	13,000	21,300	10,880	1,730	88,020	17,200	4,300	1,032
26	219,000	1,212	7,200	11,950	5,800	650	50,020	7,100	1,775	426
27	484,000	5,930	21,100	32,800	17,080	2,930	135,130	15,100	3,775	906
28	203,000	1,670	7,000	11,000	5,450	650	48,930	8,400	2,100	504
29	223,000	2,170	8,250	13,300	6,520	860	55,500	11,300	2,825	678
1929-30	217,000	1,210	7,200	11,950	5,800	650	46,900	8,300	2,075	498
31	114,000	450	1,230	4,400	720	N.A.	19,900	5,000	125	300
32	519,000	6,680	24,900	37,200	19,600	3,360	134,380	18,700	4,675	1,122
33	283,000	3,040	11,150	17,800	9,060	3,470	81,250	12,800	3,200	768
34	131,000	750	3,300	6,200	2,540	210	21,960	3,800	950	228
35	358,000	3,950	14,450	23,080	11,600	1,880	90,740	13,100	3,275	786
36	487,000	4,710	21,900	33,200	17,750	3,040	163,450	21,900	5,475	1,314
37	677,000	9,420	31,750	51,800	26,100	4,880	286,540	51,000	12,750	3,060
38	871,000	13,700	47,500	75,500	38,000	7,160	336,350	53,600	13,400	3,216
39	247,000	2,430	8,660	15,100	7,200	1,080	82,830	13,800	3,450	828
1939-40	513,000	8,816	30,938	46,958	24,288	4,666	196,610	38,400	9,600	2,304
41	642,000	11,600	18,800	35,200	20,500	5,100	227,330	35,720	12,500	5,000
42	491,000	1,300	14,000	9,000	5,000	1,300	135,450	20,623	4,400	2,500
43	671,000	1,900	20,700	23,800	14,400	3,600	336,800	99,245	32,240	8,000
44	315,000	1,552	1,120	8,620	10,700	400	104,310	23,449	6,909	2,100
45	551,000	2,750	35,000	20,936	5,100	1,300	212,770	44,546	11,200	4,600
46	356,000	505	4,510	5,560	3,200	800	98,210	20,523	3,600	2,100
47	265,000	494	3,162	3,103	3,000	800	54,220	9,785	1,700	800
48	261,300	59	795	1,886	3,200	800	66,160	13,270	500	800
49	218,900	65	973	1,902	800	200	48,890	11,854	1,200	1,000
1949-50	301,000	NA	1,070	2,905	2,400	600	62,440	11,820	1,000	900
51	421,300	567	3,413	11,351	6,800	1,700	143,420	29,765	2,100	1,400
52	825,000	6,550	18,027	27,000	27,000	8,000	308,370	83,076	17,498	5,500
53	308,100	1,360	3,544	7,997	1,800	800	99,080	31,357	6,100	1,870
54	306,100	416	2,503	6,200	2,200	650	88,690	19,339	2,634	1,160
55	276,100	779	2,700	4,900	2,100	700	64,620	14,300	3,000	750
56	724,600	6,700	12,500	31,800	21,600	5,400	210,140	42,540	7,900	2,550
57	295,100	329	1,196	3,260	2,300	575	65,860	13,740	3,430	820
58	639,754	7,114	9,000	41,500	23,000	5,750	225,350	61,800	15,500	3,700
59	154,677	817	1,420	573	350	88	31,740	9,290	786	557
1959-60	180,331	80	358	819	600	150	47,630	13,051	1,410	783
61	116,769	0	104	573	300	75	19,400	7,560	251	453
62	405,592	2,745	6,522	11,569	NA	NA	85,480	NA	2,155	NA
63	507,904	921	3,252	9,115	742	186	118,850	9,399	1,624	563
64	228,027	165	963	2,822	168	42	59,280	7,163	1,207	429
65	492,756	1,194	4,274	13,146	1,612	403	136,070	19,015	4,081	1,140
66	249,285	98	501	1,647	0	0	45,940	4,961	754	297
67	985,583	5,387	15,882	46,574	NA	NA	371,980	59,735	8,159	3,584
68	220,893	651	1,698	2,167	NA	NA	65,720	NA	NA	NA
69	1,251,036	4,902	8,476	78,896	NA	NA	NA	84,490	NA	NA
1969-70	366,837	NA	NA	10,899	NA	NA	NA	15,540	NA	NA

NA: Not Available (1) From Refrence IV-1

EXISTING SURFACE WATER CONDITIONS

Flow and Storage Data

The flows of the principal rivers and streams occurring in Tulare County areas by year are indicated in Table IV-1. Water delivered from Kings River into the Tulare County portion of Alta Irrigation District is shown on Table IV-2, "Kings River Deliveries to Tulare County".

TABLE IV-2 (1)

KINGS RIVER DELIVERIES TO TULARE COUNTY
(Alta Irrigation District)

Water Year	Diversion Ac.Ft.	Water Year	Diversion Ac.Ft.
1918-1919	82,579	1943-1944	87,002
19-20	90,323	44-45	145,652
20-21	119,540	45-46	136,726
21-22	117,691	46-47	66,337
22-23	99,755	47-48	82,380
1923-1924	23,355	1948-1949	65,519
24-25	107,336	49-50	101,329
25-26	83,928	50-51	110,152
26-27	167,742	51-52	193,524
27-28	81,816	52-53	90,759
1928-1929	58,615	53-54	108,158
29-30	60,617	1954-1955	75,457
30-31	17,862	55-56	182,236
31-32	176,980	56-57	121,419
32-33	81,089	57-58	159,585
1933-1934	24,211	58-59	72,250
34-35	136,835	1959-1960	48,770
35-36	155,876	60-61	31,709
36-37	129,293	61-62	161,145
37-38	126,836	62-63	146,787
1938-1939	78,904	63-64	86,062
39-40	131,718	1964-1965	164,272
40-41	131,701	65-66	105,538
41-42	139,644	66-67	193,964
42-43	124,030	67-68	64,924
		68-69	194,622
		69-70	116,229

(1) From Reference IV-2

Major streams which supply water through natural channels to the Tulare County area are the Kaweah and the Tule Rivers. The Kings River, a portion of which

flows through Tulare County, supplies water to the northwestern portion of the County. Additional water supplies eminate from several creeks which have intermittent flows. Much of the flow from the major streams is diverted into distribution facilities for irrigation and ground water replenishment. Large portions of this flow diversion occurs in Tulare County.

In the late 1950's and early 1960's, multi-purpose storage facilities to provide flood control, water conservation and recreation were constructed on the Kaweah and the Tule Rivers by the U. S. Army Corps of Engineers. Table IV-3 indicates pertinent data.

TABLE IV-3

RESERVOIR DATA

RESERVOIR	RIVER	STORAGE: Gross Pool A.F.*	STORAGE: Minimum Pool A.F.	COST: Total	COST: Allocation to Water Conservation
Terminus (1)	Kaweah	150,000	8,000	$23,000,000	$3,160,000
Success (2)	Tule	80,000	5,000	14,500,000	1,377,500

* One acre-foot = one acre in area covered by water one foot deep.

(1) From Reference IV-3.
(2) From Reference IV-4.

Substantial improvement in the utilization of the flows of these streams has been made possible by the regulatory accomplishments of these two reservoirs. Winter carry-over is minimal. The applicable criteria permits the storage of a substantial portion of the spring flows of these streams, thereby making the waters available at times more nearly coinciding with actual demands for irrigation water. As may be noted from the foregoing table, substantial portions of the construction costs of these two reservoirs have been allocated to water conservation. Such costs have been underwritten by local entities.

Improved distribution of these available surface water supplies benefits all of the areas since the better distribution of surface supplies serves to reduce the withdrawal of ground water supplies utilized for municipal and industrial purposes as well as agricultural needs.

These reservoirs also provide extensive recreation benefits which are enjoyed by those who are able to partake of water-oriented activities over long periods each year.

Deliveries of water from the Friant-Kern Canal of the Central Valley Project into Tulare County are indicated on Table IV-4, "Water Deliveries From Friant-Kern Canal to Tulare County Areas".

TABLE IV-4 (1)

WATER DELIVERIES FROM FRIANT-KERN CANAL TO TULARE COUNTY AREAS

Water Year	Water Deliveries (acre feet)
1949	36,901
1950	178,342
1951	320,578
1952	443,655
1953	559,293
1954	577,356
1955	651,580
1956	855,331
1957	716,403
1958	757,544
1959	587,893
1960	331,992
1961	280,815
1962	993,424
1963	964,722
1964	502,886
1965	1,064,878
1966	550,164
1967	875,886
1968	413,129
1969	727,433
1970	590,748

(1) From Reference IV-5

NOTE: 1. Deliveries to Tulare County areas have been pro-rated from total deliveries to Alta Irrigation District, Delano-Earlimart Irrigation District, Rag Gulch Water District, Orange Cove Irrigation District and Consolidated Irrigation District.

Area and water source data for the many irrigation districts and entities in Tulare County are shown in Table IV-5, "Major Irrigation Entities".

Three Rivers Diversion

In the Three Rivers area, channels ("ditches") were constructed as early as 1858 to facilitate the removal of water from the Kaweah River or its tributary forks, primarily according to riparian rights. The water was used to irrigate the pastures, groves and orchards. The major ditches that are still in use, their length and their capacities are shown on Table IV-6. There are many other smaller ditches still in use such as the Mehrton, Green, Burdick and Washburn Ditches. All of these ditches are used to irrigate approximately 500 acres of pasture and 100 acres of groves and orchards.

Due to the erratic and low flows of the North and South Forks of the Kaweah River during the summer months, the ditches or channels which divert water from these forks primarily flow in the spring and therefore cannot be relied upon for irrigation in the summer months.

Surface Water Quality Considerations

Quality data for surface water is available from published and unpublished records of the United States Department of the Interior, Geological Survey, the California Resources Agency and the County of Tulare. Generally speaking, it may be said that the surface flows in the streams occurring and passing through Tulare County are of excellent quality in their native state. Depending on the type of water year, flow and use characteristics, and time of year, samplings show particular areas in which man-made situations cause great concern, particularly as it relates to domestic use.

TABLE IV-5
MAJOR IRRIGATION ENTITIES

Entity	Tulare Co. Area (Ac) Gross	Irri-gable	Irri-gated	Source of Surface Water	Service Agri-cultural	Domestic	G.W. Pump Facilities Dist.	Priv.	Remarks
PART A: Dinuba Sub-Planning Area									
Alta I.D.	90,651	90,651	76,692	Kings R. CVP*	X			Yes	
Consolidated I.D.	4,275	4,275	3,946	Kings R. CVP*	X			Yes	
Hills Valley I.D.	600	600	600	CVP*	X			Yes	
Orange Cove I.D.	15,505	15,505	15,130	CVP	X		No	No	
PART B: Visalia-Woodlake Sub-Planning Area									
Exeter I.D.	14,729	13,763	11,619	Kaweah R. CVP	X			Yes	
Ivanhoe I.D.	10,894	10,314	9,669	Kaweah R. CVP	X		No	Yes	
Kaweah Delta W.C.D.	336,000	306,000	256,000	Kaweah R. CVP*	X		Yes		Incl. numerous Ditch Co's. and Diverters.
Stone Corral I.D.	6,275	6,116	5,496	CVP	X			Yes	
PART C: Tulare Sub-Planning Area									
Tulare I.D.	74,968	69,231	60,281	Kaweah R. CVP	X		No	Yes	
PART D: Lindsay Sub-Planning Area									
Lewis Creek W.D.	1,242	1,145	509	CVP	X		No	Yes	
Lindmore I.D.	27,171	26,422	24,371	CVP	X		No	Yes	
Lindsay-Strath-more I.D.	15,110	14,051	12,565	Kaweah R. CVP	X	X	Yes	No	

*From Surplus Water Contracts

TABLE IV-5 (Continued)
MAJOR IRRIGATION ENTITIES

Entity	Tulare Co. Area (Ac) Gross	Irri-gable	Irri-gated	Source of Surface Water	Service Agri-cultural	Domestic	G.W. Pump Facilities Dist.	Priv.	Remarks
PART E: Tipton-Earlimart Sub-Planning Area									
Alpaugh I.D.	8,100	8,100	6,000	CVP*	X	X	Yes	Yes	
Delano-Earlimart I.D.	47,227	45,243	42,363	CVP	X		No	Yes	
Lower Tule River I.D.	103,088	93,236	80,254	Tule R., CVP	X		No	No	
Pixley I.D.	70,520	61,700	37,000	Deer Cr.,CVP*	X		No	No	
Saucelito I.D.	19,224	18,628	16,550	CVP	X			Yes	
PART F: Porterville Sub-Planning Area									
Campbell-Moreland Ditch Co.	6,560	6,250	2,500**	Tule R.	X		No	Yes	Inc. service to P'ville State Hospital Well Field serving 2,500 persons.
Cloer C.S.D.	320	320	320	CVP*	X			Yes	
Ducor I.D.	11,184	11,184	5,038		X	X		Yes	
Hope W.D.	1,847	1,847	1,427	CVP*	X			Yes	
Porterville I. D.	16,890	15,781	13,652	Tule R., CVP	X		No	No	
Rag Gulch W.D.	2,368	2,368	2,310	CVP*	X			Yes	
Tea Pot Dome W.D.	2,709	2,627	2,459	CVP	X				
Terra Bella I.D.	13,344	11,975	8,958	Deer Cr.,CVP	X	X		Yes	
Vandalia I.D.	1,438	1,438	1,250***	Tule R.	X		Yes	No	

* From Surplus Water Contracts

** Includes 1,250 acres served by Vandalia Irrigation District from ground water basin recharged by Campbell-Moreland ditch flow.

*** Also included in Campbell-Moreland Ditch Company area.

TABLE IV-6 (1)

DITCHES IN THE THREE RIVERS AREA

Ditch	Approximate Length, Ft.	Approximate Headgate Capacity, cfs
On South Fork:		
Putnam	12,000	4.0
Blossom	2,300	0.5
Alles-Britten-Kelly	10,000	5.0
McCoy	12,000	0.5
On North Fork:		
Halstead	15,000	3.5
Brundage	8,300	4.0
On Middle Fork:		
Bahwall	8,600	5.0
Ererton	3,800	1.0

(1) From Reference IV-6.

Bacteriological tests taken from direct diversions of water from the Kaweah River in low-flow periods during the summer and fall months show unsafe concentrations of impurities which bring water quality below the current U. S. Public Health Drinking Water Standards. This situation is a result of individual sewage disposal systems which are not located in a soil mantle of sufficient thickness as to provide adequate filtration of sewage before reaching the waters of the Kaweah River. Instead, the thin soil mantle present over much of the Kaweah River drainage basin in the Three Rivers area acts as a conductor of sewage effluent, in a state of high bacteriological contamination, to the river.

Under normal and high water flow conditions, the diffusion of the bacteria by large amounts of water renders the water quality more acceptable; under

low-flow conditions the river water becomes highly contaminated in the immediate vicinity of Three Rivers and for some distance downstream. Two things are evident: (1) Water cannot be used from the Kaweah for domestic consumption without pretreatment; (2) A central sewage collection and treatment system is necessary in the Three Rivers basin before the Kaweah River water can safely be used for body contact recreation as well as domestic consumption.

The results of several bacteriological tests on Kaweah River water near Three Rivers and below Terminus Dam taken periodically in 1968, 1969 and 1970 are shown in Table IV-7. This data indicates coliform presence in numbers far in excess of U. S. Public Health Service Drinking Water Standards which provide that sample counts should not exceed one.

The California Department of Public Health (October 20, 1964) established standards for golf course irrigation as follows: "The effluent used for irrigation will be considered adequately disinfected if at some point in the treatment process the median most probable number of coliform organisms does not exceed 23 per 100 milliliters."

Because of such bacteriological contamination, it is also hazardous to rely on shallow ground water supplies for domestic uses in areas immediately adjacent to the Kaweah River. The risks of delivering contaminated water for domestic uses are increasing as the density of population increases and the accretion to river flows of untreated or improperly treated discharge continues or increases.

In 1968, the Water Resources Division of the Geological Survey of the U. S. Department of the Interior in a report titled: Geology, Hydrology and Quality of Water In the Hanford-Visalia Area, noted the following:

"Water from the Kaweah, Tule and Kings Rivers has calcium bicarbonate in type with low dissolved solids content. The general similarity of quality is shown by the chemical diagrams - - -. However, - - - indicates that there are minor differences in the chemical character of the water. The graphs show that water in Tule River has about three times the concentration of dissolved solids found in water from the Kaweah and Kings Rivers. The Tule River drains an area of lower elevation than the Kaweah and Kings Rivers.

"Although seasonal deviations from average chemical composition were not investigated, inspection of several analyses showed minor seasonal differences in total concentration of dissolved solids. In the spring and early summer when discharge is greater, water in the Kaweah and Tule Rivers show low concentrations of dissolved solids and in late summer and early autumn when discharge is lowest, concentration is appreciably higher."

From the same report, the following is taken with respect to "Intermittent Streams": "that intermittent streams have roughly 2 to 10 times the concentration of dissolved solids found in water from perennial streams." At times, high concentration of dissolved solids in intermittent streams exceed the Drinking Water Standards set up by the U. S. Public Health Service.

Scattered tests in foothill and mountain areas indicate that localized problems exist with arsenic concentrations that equal or exceed the U. S. Public Health Service Standards for Drinking Water. These problems are apparently due to the low flows experienced at the time of the tests. Abnormally low flows tend to amplify the concentrations of such chemicals in the water.

TABLE IV-7

BACTERIOLOGICAL TESTS - KAWEAH RIVER [1]

Location / Date	Near Three Rivers Coliform MPN/100ml	Below Terminus Dam Coliform MPN/100ml
10-18-68	460	
12- 9-68		150
4- 7-69	1100	1100
5- 5-69	93	1100
8- 4-69	2400+	1100
9-15-69	460	2400+
10- 6-69	460	460
11- 3-69	150	7
12- 1-69	460	1100
1-12-70	460	240
3- 3-70	460	1100
6- 8-70	2400	2400
7- 7-70	1100	2400
8- 3-70	2400	150
9- 8-70		2400
10- 5-70	460	43

(1) From Reference IV-7

Definitions:

Coliform - a group of organisms, whose presence is a satisfactory bacteriological indicator of contamination of pollution in water.

MPN: Most Probable Number - an index of the number of coliform bacteria which more probably than any other number would give the results shown by laboratory tests.

Note: U. S. Public Health Service Drinking Water Standards provide that not more than 60 percent of the samples in any month shall show the presence of the coliform group. (72.203 b (2))

Source of Data: Tulare County Health Department.

GROUNDWATER

General Data

Groundwater conditions in Tulare County have varied over the years from adequate to those of substantial overdraft or inadequacy. The development of centrifugal and deep well pumps, along with the development of irrigated agriculture in the county, brought about extensive use of groundwater supplies. In the 1920's, the 1930's and the early 1940's, groundwater demands and withdrawals increased at a high rate and overdraft conditions became obvious. These overdrafts resulted in a continuing lowering of groundwater levels in the areas of extraction and in areas of down-slope in the direction which underground flows would otherwise have taken.

An extreme example of overdrafts developed in the Lindsay area where the so-called "Lindsay Cone" resulted from large withdrawals of groundwater in excess of natural recharge. This condition in the Lindsay area and in several other parts of the county continued until the Friant-Kern Canal, one of the initial units of the Central Valley Project, was completed. Friant-Kern water deliveries commenced in 1949 in limited quantities. Full service became available in 1951.

The delivery of these supplemental water supplies from the Friant-Kern Canal has made it possible to stop or reduce groundwater withdrawals in the canal service areas. The result has been a general raise in the groundwater levels in those areas.

Groundwater conditions in Tulare County vary due to depth of aquifers (water bearing stratum), permeability of various layers of the sub-surface structure, amount of pumping and natural and artificial recharge activities. In 1957, the Groundwater Branch of the Geological Survey of the U. S. Department of the Interior prepared a report entitled "Groundwater Conditions and Storage

Capacity in the San Joaquin Valley, California". This report notes three distinct bodies of groundwater:

> "(1) A body of unconfined and semi-confined fresh water in alluvial deposits ---; (2) A body of fresh water confined beneath the clay bed - - -; and (3) A body of saline connate water contained in marine sediments of middle pliocene or greater age which underlies the fresh water body through the valley." - - - "The ultimate source of the groundwater in the San Joaquin Valley is precipitation on the valley and its tributary drainage basins. Replenishment to the unconfined and semi-confined groundwater bodies is by seepage from streams, by underflow in the permeable materials flooring the canyons bordering the valley, whereby losses from irrigation canals and ditches and deep penetration of water applied for irrigation in excess of planned requirements, and in small part by deep penetration of rainfall on the valley floor, especially in the northeastern part of the Valley." (Page 21)

In the Lindsay area, the groundwater levels were reduced to the extent that some of the connate waters of very poor quality were reached by the pumps. Fortunately supplemental water from the Friant-Kern Canal was delivered before it became necessary to use large quantities of these connate waters which would have permanently damaged developed areas, by leaving an injurious residue of mineral deposits on lands where such water was used for irrigation purposes.

Specific Yields

This Geological Survey report describes various "Storage Units" areas and indicates specific yields in the 10 to 200 foot depths below the surface as an indication of the extensive groundwater storage capacity for withdrawal and subsequent replenishment. The greater the specific yields, the greater the groundwater storage capacity.

Data in the following table is taken from the U. S. Geological Survey Report (1957) to show the range of specific yields:

TABLE IV-8 (1)

SPECIFIC YIELDS (2) BY STORAGE UNITS

Storage Unit	Location	Average Specific Yield 10-200 Foot Depth
(2)Kings River	Kings River alluvial fan, Fresno and Tulare Counties	12.7%
Dinuba Interstream	Area between the alluvial fans of the Kings and Kaweah Rivers	6.7%
Kaweah-Tule	Alluvial fans of Kaweah and Tule Rivers east of Tulare Lake bed and west of the area adjacent to foothills	9.9%
Lindsay Interstream	Between the alluvial fans of the Kaweah and Tule Rivers adjoining the foothills	6.9%
(3)White-Poso	Alluvial fans of Deer Creek, White River, Poso Creek and intervening streams	9.1%
San Joaquin Valley		10.3%

(1) From Reference IV-8.

(2) Specific Yield of Soil: The ratio of the volume of water which, after being saturated, it will yield by gravity to its own volume.

(3) Part of area lies outside of Tulare County.

Generally the areas closer to the foothills have more limited groundwater yields. Additionally, the depth of the aquifers is considerably less in the areas closer to the foothills so that the total capacity of groundwater storage is generally less in those areas closer to the east limits of the Valley floor.

As mentioned above, groundwater reservoir capacities, safe withdrawal yields, and aquifer depth diminish rapidly in the foothill and mountain areas east of the Valley floor. Hence, expanding demands for water to meet community water needs and agricultural needs in these areas represent a serious water supply matter since native water supplies are not sufficient to meet the increased demands.

In foothill and mountain areas adjacent to streams, river flows readily find their way to these limited shallow aquifers. Pumps drawing from these aquifers often deliver water which is substantially the same in quality as the river flows.

Ground Water Levels

Extensive records of depth to groundwater from surface bench marks have been developed over a period of many years in Tulare County. Federal, state and local entities have made these groundwater level observations; the greatest number of these observations are performed by the cities and the irrigation districts.

Prior to the deliveries of Friant-Kern Canal supplemental supplies, severe lowering of groundwater levels had occurred in irrigated areas which did not receive substantial surface water supplies from the Kaweah River or Tule River. In certain areas where adequate river water was not available, groundwater levels dropped as additional lands were developed.

With the commencement of Friant-Kern Canal deliveries in 1949 and 1950, the water level drop was largely arrested or slowed in the delivery areas.

Land Subsidence

The U. S. Geological Survey has made intensive studies of groundwater conditions and land surface subsidence in the Tulare-Wasco area and the San

Joaquin Valley for many years concluding that water level change is the cause of practically all measurable subsidence in the Tulare-Wasco area.

Groundwater Quality

The results of groundwater tests for mineral constituents taken in various Tulare County areas over a period of several years are shown on Table IV-9. These tests indicate that with few exceptions, Tulare County groundwater quality is adequate to excellent for domestic, municipal or agricultural uses. These exceptions include the Allensworth area where it is necessary to provide special groundwater treatment for domestic purposes in order to remove arsenic.

Many studies have been made in efforts to anticipate and evaluate problems having to do with nitrates and sodium compounds appearing in groundwater supplies. No conclusive results have been identified relative to the occurrence and source of nitrates in Tulare County. In certain areas, such as Lindsay, food processing has been held responsible for deterioration of groundwater quality and discharges of materials such as salt brines to sub-surface aquifers have been discontinued.

EXISTING DOMESTIC WATER DISTRIBUTION SYSTEMS

General Notes

1. Domestic water systems with more than 25 services have been surveyed and evaluated. The results are shown in Table IV-10, "Domestic Water System Data".
2. A relatively common deficiency noted for the older distribution systems is the use of sub-standard 2 and 3 inch water mains. Many of these systems have larger service areas than were originally contemplated with the result that adequate pressures can not be maintained during periods of maximum demand. Dead end lines (the end of a water main which is not connected to other parts of the distribution system by means of a connecting loop) in many instances tend to worsen this situation.
3. Limited credit, if any, is given for hydrants on distribution lines of 4 inch diameter or less in the establishment of fire protection ratings.

Supply

Nearly all domestic water in Tulare County is drawn from the ground. The exceptions are in areas in, or adjacent to, the foothills or mountains. Examples of areas or communities obtaining water from surface supplies are: Springville, portions of the Three Rivers vicinity, Camp Nelson and areas east of Lindsay.

Filtering or treatment plants are not usually required for water derived from wells although some such facilities are operating where special quality problems exist.

TABLE IV - 9 (1)

GROUNDWATER QUALITY ANALYSES

Location / Date — Mineral Constituents In Parts Per Million	U.S.P.H.S. Drinking Water Standards in P.P.M. — Mandatory Limit	U.S.P.H.S. Drinking Water Standards in P.P.M. — Recommended Limit	Allensworth 3/66	Alpaugh 3/66	Exeter 10/67	Goshen 3/66	Ivanhoe 2/70	Lindsay 5/63	London 9/70	Orosi 9/70	Pine Flat 9/70	Strathmore 1/64	Terra Bella 6/62	Teviston 3/66	Near Three Rivers 6/67	Traver 3/71
Calcium			2.80	15.70	28.00	7.20	27.40	66.00	35.50	64.60	4.40	36.50	3.50	8.00	39.20	32.90
Iron		0.3	0.21	0.12	0.12	0.02	.016	.23	0.12	0.01	0.01	0.05	0.60	0.08	0.10	Nil
Manganese		0.05	0.05	<0.05	0.00	Nil	Nil	0.05	Trace	Nil	0.00	0.05	<0.05	<0.05		0.01
Sodium	200		380.00	100.00	38.00	25.00	33.00	76.10	21.00	34.00	10.80	58.20	5.10	26.10	22.10	25.10
Potassium			0.60	2.70	3.00	Trace		5.10	1.00	2.50	2.24	4.50	1.30	1.00		1.00
Chlorides		250	16.80	87.00	16.50	10.60	17.10	210.00	24.80	31.90	9.20	47.10	6.30	6.80	11.30	47.40
Sulfates		250	61.60	5.30	14.90	3.30	7.00	36.70	2.50	40.00	8.20	31.00	1.10	6.50	17.30	7.00
Fluorides	1.8	0.7-1.0	3.20	0.70	0.00	0.22		0.10	0.20	0.12	0.10	0.20	0.10	0.60	0.10	0.30
Nitrates		45	0.40	<0.50	4.30	2.40	14.20	32.10	12.80	47.40	0.60	49.80	<1.00	3.10	Trace	0.60
Acidity			8.50	7.80	.8.00	8.40		7.90	7.80		7.30	7.60	7.20	8.40		7.90
Arsenic	0.05	0.01	0.60													Nil
Specific Conductance											8.50					
Carbonates		<20		0.00		3.00	Nil	0.00	0.00	0.00	0.00			2.00	0.00	Nil
Bicarbonates		150		150.00	153.20	61.00	189.10	124.00	155.60	295.90	54.90	158.00	17.50	62.00	153.70	158.60
Silica						0.50	19.60			44.00	14.80	17.20	1.50			
Magnesium				3.80	10.70		12.10	35.30	12.50	22.50	7.80			0.60	3.40	8.80
Sulfides															0.00	
Nitrites											0.00				0.00	
Ammonia															Trace	

(1) From Refrence IV-7

TABLE IV -10

DOMESTIC WATER SYSTEM DATA

(25 Services or More)

CITY or COMMUNITY	Diversion or Maximum Pumping Capacity (GPM)	WELLS No.	WELLS Diameter (in.)	WELLS Depth (ft)	Average Depth to Standing Water Level (ft)	Maximum Size of Mains (in.)	No. of Services	Storage Tanks Pres. (Gal)	Storage Tanks Open (Gal)	Treatment	Population 1960	Population 1970	Public or Quasi Public Owned System
PART A: Dinuba Sub-Planning Area													
Cutler	2,200	3	12	400	20	8	650		57,000	None	2,191	2,503	Yes
Delft Colony	No System											428	
East Orosi	250	2	10	235	72	6	60	2,000		None		100	Yes
London	420	3	12	213	37	4	217	None		None		708	Yes
Monson	No System											100	
Orosi	1,842	3		375	20	8	630	10,000		None	1,048	2,757	Yes
Seville	140	1		25	20	4		1,050	12,300			314	No
Sultana	No System											325	
Traver	1,000	2	14	225	37	6	98		1,500	None	350	374	Yes
Yettem	No System											354	
PART B: Visalia-Woodlake Sub-Planning Area													
Berryson W.C.		3		210	69	6	179	13,000		None			No
Buhl Water Sys.	1,225	2	12	220	78	6	178	8,000		Chlorination		712	No
Elderwood	No System											214	
Exeter	3,889	5	14	450	80	10	1,626		500,000	None	4,264	4,475	Yes
Farmersville	2,500	3		245	25	10	975	9,950		None	3,101	3,456	Yes
Goshen	860	3	12	302	100	6	269	13,500		None	1,061	1,324	Yes
Ivanhoe	1,311	4	12	261	80	8	700	23,000		None	1,616	2,530	Yes
Lemon Cove	120	2	8	130	15	3	34	3,000		None		137	No
Lindcove	No System											147	
Linwood MWC		1		300		4	70		2,000	None		210	Yes
Oak Ranch Highlands	710	2	12	205	60	8	95	5,000		None		371	No
Patterson Tract	375	2	8	250	120	8	125	5,000		None		728	Yes
Tooleville	No System				75							165	
Tract 92 C.S.D.	875	2	12	250	30	6	73		5,000	None		325	Yes
West Goshen WC	250	1	10	320	140		31	5,000		Chlorination		500	Yes
Woodlake	2,128	7	12	176	36	10	1,062		500,000	None	2,623	3,371	Yes

TABLE IV - 10

DOMESTIC WATER SYSTEM DATA

(25 Services or More)

City or COMMUNITY	Diversion or Maximum Pumping Capacity (GPM)	WELLS No.	WELLS Dia-meter (in.)	WELLS Depth (ft)	Average Depth to Standing Water Level (ft.)	Maximum Size of Mains (in.)	No. of Services	Storage Tanks Pres. (Gal)	Storage Tanks Open (Gal)	Treatment	Population 1960	Population 1970	Public or Quasi Public Owned System
PART C: Tulare Sub-Planning Area													
Canby M.W.C.		2					40		4,500	None		160	Yes
Eastwood W.C.	690	2		380	92	6	51		6,000			150	No
Lone Oak MWC	300	1		152	82	2½	40	3,000		None		200	Yes
Pratt MWC (Tracts 104 & 53)	740	2		275	78	6	145	8,000		None		531	Yes
Tract 51	No system											170	
Waukena	No system											154	
PART D: Lindsay Sub-Planning Area													
Central W.S.		1		410	96	4	43		3,000	None		110	Yes
Lindsay	4,235	8	12	425	85	12	1,869		1,500,000	None	5,397	5,206	Yes
Plainview	520	2	12	450	161	6	187	5,236		None		842	Yes
Strathmore	1,795	5	14	390	50	8	450		65,000	None	1,095	1,221	Yes
Tonyville (Served by Lindsay-Strathmore ID)					45	6	50			Chlorination		202	Yes
PART E: Tipton-Earlimart Sub-Planning Area													
Allensworth	600	1	16	1,300	125	4	30			Carbon Dioxide		180	Yes
Alpaugh	2,110	2			120		120		65,000	Settling Basin		771	Yes
Earlimart	1,500	5	12	400	150	10	770	20,000		None	2,897	3,080	Yes
Pixley	2,759	3	14	920	210	12	601		50,000	None	1,327	1,584	Yes
Teviston	500	1	12				40	5,000		None		198	Yes
Tipton	1,650	2	14	820	142	6	299		25,000	None		945	Yes
Woodville	2,200	2	14	600	60	12	259	25,000	25,000	None	1,045	1,031	Yes

TABLE IV - 10

DOMESTIC WATER SYSTEM DATA

(25 Services or More)

City of COMMUNITY	Diversion or Maximum Pumping Capacity (GPM)	WELLS No.	WELLS Diameter (in.)	WELLS Depth (ft)	Average Depth to Standing Water Level (ft.)	Maximum Size of Mains (in.)	No. of Services	Storage Tanks Pres. (Gal)	Storage Tanks Open (Gal)	Treatment	Population 1960	Population 1970	Public or Quasi Public Owned System
PART F: Porterville Sub-Planning Area													
Central MWS		1	8	250	40		35	2,500		None		175	Yes
Cotton Center		1		220	120	4	32	500		None		217	Yes
Damsen WC		1		210	69	4	50	2,500		None		175	No
Ducor	175	1	14	1,020	420	6	60		12,000	None	218	264	Yes
East Porterville	400	4		110	30	4	135	6,000		Chlorination		600	Yes
Juranda WC	410	2		132	58		32	3,000		None		90	No
Lindale WC	2,761	5		200	20	8	712	8,000		None		2,500	No
Pleasant Grove WC	550	1	5	176	18	4	99	2,500		None		300	No
Poplar	1,400	4	11	365	96	6	450	11,000		None	1,478	1,239	Yes
Porterville State Hospital	1,935	6	12	330	25	12			1,000,000	Fluoridated		2,150	Yes
Richgrove	457	2		800	367	6	213	10,000	40,000	None	400	1,023	Yes
Rio Vista WC	30	2		100	30		50	2,000		None		200	Yes
Spallina WC	200	1		200	32		25		2,000	None		80	No
Terra Bella	1,000	3	14	600	200	12	201			None	964	1,037	Yes
Tract 213	350	1	10	200	35	6	118	2,000		Chlorination		307	No
PART G: Southeast Foothill-Sierra Sub-Planning Area													
Camp Nelson	280	None				4	200		300,000	Chlorination		1,076	Yes
Cedar Slope MWC	28	None					84		66,000	Chlorination		250	Yes
Springville	1,350	None				8	225*		120,000	Chlorination		1,500	Yes
PART H: Northeast Foothill-Sierra Sub-Planning Area													
Alta Acres CSD (Tracts 107 & 350)	120	2		65			42	315	71,000	Ultra-Violet		126	Yes
Kaweah River Acres MWC	30	3		18			25		10,000	None		82	Yes

* Not including hospital

Systems

Brief remarks on certain of the domestic water systems are provided in Table IV-11.

Most of the smaller distribution systems have not been designed or constructed with adequate provisions for enlargement or additional service. In many cases, the installation of larger mains or pumps would alleviate present deficiencies.

The larger systems tend to be of more adequate design and construction. This situation probably stems from the fact that the larger systems are operated by public agencies which have the ability to develop the long-term financing necessary for continued growth and maintenance.

The publicly-owned systems are operated by cities, public utility districts, water districts, community service districts or irrigation districts. All of these entities have the ability to issue warrants, general obligation bonds, revenue bonds or combinations of these. In addition, these agencies have strong powers of assessment, and therefore their ability to finance capital improvements or new water systems is infinitely greater than mutual or private water service companies.

On the other hand, quasi-public entities such as mutual or private water companies, do not possess these fund raising abilities; consequently they are limited as to their capabilities to meet changing conditions or to build adequate (supply, pressure or fire protection) systems in the first instance.

TABLE IV-11

REMARKS ON DOMESTIC WATER SYSTEMS

City or Community	Remarks
PART A: Dinuba Sub-Planning Area	
Cutler	Proposed expansion northerly and westerly to include one new well.
Orosi	System being expanded to adjacent areas.
Traver	Existing system is fairly new and adequate for present conditions.
PART B: Visalia-Woodlake Sub-Planning Area	
Exeter	Installation of 10" main and new well now under study.
Farmersville	Existing system is adequate.
Goshen	Elimination of dead ends desirable.
Ivanhoe	Improvements to the system anticipated.
Lemon Cove	Existing system is satisfactory for present conditions.
Linwood MWC	Acquisition by California Water Service Company is contemplated.
Oak Ranch Highlands	Operated by California Water Service Company.
Patterson Tract C.S.D.	System and supply is adequate for some contemplated expansion.
Tract 92 C.S.D.	System and supply is adequate.
West Goshen W.C.	Additional service connections being made.
Woodlake	System being improved.

TABLE IV-11 (Continued)

City or Community	Remarks
PART C: Tulare Sub-Planning Area	
Lone Oak M.W.C.	Proposed new 6" line and larger pressure tank.
Pratt M.W.C. (Tracts 104 & 53)	Grid system is satisfactory.
PART D: Lindsay Sub-Planning Area	
Lindsay	Installation of additional wells under study.
Strathmore	System has stand-by connection to Lindsay-Strathmore I.D.
Tonyville	Served by Lindsay-Strathmore I.D.
PART E: Tipton-Earlimart Sub-Planning Area	
Allensworth	Special treatment required to eliminate arsenic found in ground water.
Alpaugh	Served by Alpaugh I.D.
Earlimart	Expansion to east planned with new lines and well.
Pixley	Installing new well and 10" highway crossing to east of 99 Highway.
Teviston	Present system provides minimum service.
Tipton	System needs additional lines to eliminate dead ends.
Woodville	Some old lines need replacement.

TABLE IV-11 (continued)

City or Community	Remarks
PART F: Porterville Sub-Planning Area	
Cotton Center	Existing system consists of 2" and 4" lines.
Ducor	Existing system will not support expansion.
East Porterville	Installation of new well under study.
Poplar	Pumping capacity appears adequate.
Porterville State Hospital	Modern system.
Richgrove	Needs larger lines and larger pump.
Terra Bella	Existing system being improved.
Tract 213	Existing system is satisfactory.
PART G: Southeast Foothill - Sierra Sub-Planning Area	
Camp Nelson	The present water supply is restricted, which will be a limiting factor in determining future growth and expansion patterns. No looping of the existing systems has been accomplished.
Cedar Slope MWC	Replacement pipe and enlargement storage capacity underway.
Springville	Supply system improvements planned.
PART H: Northeast Foothill - Sierra Sub-Planning Area	
Alta Acres C.S.D.	Additional well or supply desirable.

URBAN WATER USE

Per capita water use, or average water used per person, has been determined by relating total water deliveries for all urban purposes to the population served.

The historical trend in per capita water use has been one of increase, in most categories. The evidence seems to indicate that use increases with a rising standard of living. However, projections for urban water demands are effected by several considerations.

Some of the early increases were due to the advent of large water-cooled air-conditioners and evaporative coolers. Restrictions have been applied so that further increases for this purpose are not anticipated.

Anticipated pressures on land and attendant development costs will tend to increase densities and hence decrease area available for lawn and garden areas, thereby decreasing outside water use.

There is also some likelihood of reduced water use within the industrial sector. The growing concern over pollution and stronger effluent controls may result in less water intake. Increasing water costs and waste water treatment will encourage technological changes and economics in water use.

WATER SYSTEM PRIORITIES

The choice of groundwater rather than surface water as a major source of supply has generally been made by the respective controlling agencies on the basis of a comparison of advantages and disadvantages. Groundwater is particularly accessible and may be reached within a short distance of its place of use, whereas surface water, if available, may require transmission facilities between points of availability and the areas of use. In Tulare County, groundwater is usually available while surface water in streams has already been fully appropriated. The annual yield from wells and springs is generally more constant with time than surface sources, especially during periods of variable hydrologic conditions. Water from underground sources is generally more uniform in temperature and soluble mineral elements than water from surface sources, and is generally relatively free of bacterial contamination and inert material turbidity.

More acute water shortages are anticipated as presently developed groundwater withdrawals continue. Increasing average depths to groundwater and an ever increasing occurrence of land surface subsidence within the groundwater basin give indication that the policy of withdrawing groundwater in excess of replenishment cannot continue without adverse economic and physical results.

Improved and additional groundwater re-charge methods and facilities should be developed. Cessation of pumping made possible by delivery of supplemental surface water is the most effective and direct means to stabilize groundwater conditions. Improved water application methods utilizing, if possible, lesser quantities of water would result in lesser groundwater withdrawals.

Better and improved utilization of the storage capacity of the groundwater reservoir conjunctively with existing and additional surface water supplies would insure a sound economic basis for the future.

A prime problem in reaching and maintaining improved conditions is the education and support, not only of the water user as an individual, but of the public as a whole. The eventual major benefits to the general area in increased stability of water supplies, augmented income, reduction of damage to the groundwater reservoir, and reduction of chances of pumping poor quality groundwater, must be understood by the general public in order that support may be secured. (Reference IX-1).

A thorough review and analysis and explanation of the engineering, financial, and economic feasibility and justification of proposed improved application techniques, groundwater recharge methods and conservation projects will do much to enhance their desirability and attractiveness to water users and the general public. Many of the legal considerations involved in further groundwater development will necessarily be solved in the program formulation process. Protective legislative authority involving all public agencies will provide the basis upon which the maximum conservation and development of water resources, particularly groundwater resources, will be accomplished for the greater public benefit.

The consideration of proper management of existing water resources must, of necessity, be considered of utmost priority. Production capacity requirements as presented in Tables VIII-1 and VIII-2 give indication that, in general, existing water supply systems will be unable to properly meet future demands.

Unless substantial quantities of additional water can be made economically available by one or more methods, some existing investments, both urban and rural will be endangered. It is therefore of utmost importance that additional imported water supplies be sought for use in this area.

Once an adequate supply of water is provided, the individual communities within the county must be sure that facilities are constructed to adequately and effectively distribute the supply to individual consumers.

In many instances, water to meet maximum day demands and required fire flows has not been provided. Existing standby or auxiliary power sources are not adequate in many areas, to insure required water deliveries during power outage conditions. Construction of required facilities should be initiated at the earliest possible date to bring existing systems up to minimum standards. Whenever possible, consideration should be given to improving upon minimum standards.

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CHAPTER FIVE

EVALUATION OF EXISTING WASTEWATER FACILITIES

CHAPTER V

EVALUATION OF EXISTING WASTEWATER FACILITIES

WASTEWATER QUANTITIES AND ORIGIN

General

Historically, Tulare County's economy and land use pattern has been oriented almost exclusively toward agriculture. Many communities have been directly associated with the processing and packing of the agricultural products produced in the planning area, with the bulk of the industrial wastewater having been generated by these industries. Generally, this industrial development is located in proximity to the larger, more highly developed communities and industrial wastewaters are discharged to existing treatment facilities owned and operated by these communities.

Domestic and Industrial Distribution

Wastewater quantities and characteristics are presented in Table V-1. As indicated, there are eighteen wastewater treatment and disposal facilities within the planning area for which measurable quantities of wastewaters may be determined. Lindsay and Strathmore are the only plants which receive distinguishable and significant industrial flows.

The comparatively high per capita domestic flows in Exeter, Ivanhoe, Woodlake, Lindsay, Strathmore, and Tipton may be due to the existence of commercial and industrial inputs which are not separately metered. The exceptionally high per capita flow in Ivanhoe is, of course, partially caused by storm water inflow to the combined system. Groundwater infiltration and illicit drainage connections may also influence these figures. The relatively low per capita flows in Cutler, Orosi, and Terra Bella may be attributable to the fact that portions of the indicated population are actually serviced by septic tanks.

Communities with Septic Tanks

In order to give some indication as to the total quantity of wastewater entering the groundwater system, wastewater quantities for communities with septic tanks were predicated on an assumed standard of 100 gallons per capita per day (gcd). This figure allows for nominal domestic water use and some associated commercial development, but does not include allowance for industrial wastewaters.

TABLE V-1

WASTEWATER QUANTITIES AND CHARACTERISTICS
TULARE COUNTY

City, Community, or Tract	Total (1) 1970 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (4)
		Flow (2) (mgd)*	BOD (3)* (mg/l)*	Per Capita (gcd)	Flow (mgd)	BOD (mg/l)	Total (lbs/day)
Sub-Planning Area A							
Cutler	2,503	0.15	200	60			250
Delft Colony	428	0.04 (a)	200	100			67
East Orosi	100	0.01 (a)	200	100			17
London	708	0.07	200	100			117
Monson	100	0.01 (a)	200	100			17
Orosi	2,757	0.15	200	55			250
Seville	317	0.03 (a)	200	100			50
Sultana	325	0.03 (a)	200	100			50
Traver	374	0.04 (a)	200	100			67
Yettem	354	0.04 (a)	200	100			67
Sub-Planning Area B							
Elderwood	241	0.02 (a)	200	100			33
Exeter	4,475	0.84 (d)	200	175			1,400

* See "Glossary of Definitions" in Appendix.

TABLE V-1 (Continued)

WASTEWATER QUANTITIES AND CHARACTERISTICS
TULARE COUNTY

City, Community, or Tract	Total (1) 1970 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (4)
		Flow (2) (mgd)	BOD (3) (mg/1)	Per Capita (gcd)	Flow (mgd)	BOD (mg/1)	Total (lbs/day)
Farmersville	3,456	0.41 (c)	350	120 (e)			1,200
Goshen	1,324	0.13 (a)	200	100			217
Ivanhoe	1,595	0.32 (b)	265	200			706
Lemon Cove	187	0.02 (a)	200	100			33
Lindcove	147	0.01 (a)	200	100			17
Linnell Farm Center	658	0.05	410	70			171
Patterson Tract	728	0.07 (a)	200	100			117
Oak Ranch	185	0.02 (a)	200	100			33
Tooleville	165	0.02 (a)	200	100			33
Woodlake	3,371	0.45 (h)	372	134			1,400
Tract 92	325	0.03 (a)	200	100			50
Sub-Planning Area C							
Waukena	154	0.02 (a)	200	100			33
Tract 51	170	0.02 (a)	200	100			33

TABLE V-1 (Continued)

WASTEWATER QUANTITIES AND CHARACTERISTICS
TULARE COUNTY

City, Community, or Tract	Total (1) 1970 Population	Origin and Average Characteristics: Domestic Flow (2) (mgd)	Domestic BOD (3) (mg/l)	Domestic Per Capita (gcd)	Industrial Flow (mgd)	Industrial BOD (mg/l)	BOD (4) Total (lbs/day)
Tract 104	1,039	0.10 (a)	200	100			167
Sub-Planning Area D							
Lindsay (Municipal)	5,206	0.75	372	144			2,330
Lindsay (Industrial)					0.91	1,300	9,870
Plainview	842	0.08 (a)	200	100			134
Strathmore	1,221	0.20 (d)	200	164	(f)		334
Tonyville	202	0.02 (a)	200	100			33
Sub-Planning Area E							
Allensworth	180	0.02 (a)	200	100			33
Alpaugh	771	0.08 (a)	200	100			134
Earlimart	3,080	0.29	200	94			484
Pixley	1,584	0.16	200	100			267
Teviston	198	0.02 (a)	200	100			33

TABLE V-1 (Continued)

WASTEWATER QUANTITIES AND CHARACTERISTICS
TULARE COUNTY

City, Community, or Tract	Total (1) 1970 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (4) Total (lbs/day)
		Flow (2) (mgd)	BOD (3) (mg/1)	Per Capita (gcd)	Flow (mgd)	BOD (mg/1)	
Tipton	945	0.14	200	150 (c)	(g)		234
Woodville	1,031	0.10	200	100			167
Woodville Farm Center	565 (c)	0.04	288	66			96
Sub-Planning Area F							
Cotton Center	217	0.02 (a)	200	100			33
Ducor	264	0.03 (a)	200	100			50
Poplar	1,239	0.12 (a)	200	100			200
Richgrove	1,023 (c)	0.10 (a)	200	100			167
Terra Bella	1,037 (c)	0.07	246	67			143
Tract 213	307	0.03 (a)	200	100			50
Sub-Planning Area G							
Camp Nelson	1,076	0.11 (a)	200	100			183
Springville	1,500	0.15	200	100			250

TABLE V-1 (Continued)

WASTEWATER QUANTITIES AND CHARACTERISTICS
TULARE COUNTY

City, Community, or Tract	Total (1) 1970 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (4) Total (lbs/day)
		Flow (2) (mgd)	BOD (3) (mg/l)	Per Capita (gcd)	Flow (mgd)	BOD (mg/l)	
Sub-Planning Area H							
Three Rivers	1,102	0.11 (a)	200	100			183
Tract 107	38	0.01 (a)	200	100			17

(1) From Chapter III.

(2) Average daily flows based on information contained in reports and questionnaires, and from interviews.

(3) An Average BOD of 200 was assumed for all domestic flows where specific test data was not available.

(4) Average daily BOD loading including seasonal industrial wastewaters.

(a) Estimated septic system flows based on 100 gcd.

(b) Combined domestic, industrial, and storm flows.

(c) From Tulare County Liquid Waste Data questionnaire.

(d) Combined domestic and industrial flow.

(e) From metered flow data taken 1 July 69 - Dec. 69, at which time service population was estimated at 1,750.

(f) Industrial flows account for 50 percent of peak loads, but are not metered.

TABLE V-1 (Continued)

WASTEWATER QUANTITIES AND CHARACTERISTICS
TULARE COUNTY

(g) Several industrial connections plus a creamery discharge to the municipal system, but the flows are not metered.

(h) From Reference V-1.

WASTEWATER CHARACTERISTICS

Domestic Wastewater Characteristics

Limited information is available regarding the characteristics of domestic wastewater generated in the planning area. Nevertheless, evaluations as to the effectiveness of existing treatment facilities may reasonably be based upon the assumption that the characteristics of domestic wastewaters are generally consistent with those measured in other communities of similar size and character. Typical domestic wastewater characteristics which may be utilized for subsequent planning purposes are presented in Table V-2.

TABLE V-2

AVERAGE COMPOSITION OF DOMESTIC SEWAGE

State of Solids	Composition (mg/l)			5-day* 20°C BOD (mg/l)
	Mineral	Organic	Total	
Suspended	85	215	300	150
Settleable	50	130	180	70
Non-settleable	35	85	120	80
Dissolved	265	265	530	50
Total	350	480	830	200

* See "Glossary of Definitions" in Appendix.

Source: Engineering Science

Fig. V-2

LIST OF SYMBOLS

WASTEWATER TREATMENT FACILITIES

———	WASTEWATER FLOW PATH
- - - - - -	SLUDGE FLOW PATH
L	LIFT STATION
BS	BAR SCREEN
CM	COMMINUTOR
BM	BARMINUTOR
GC	GRIT CHAMBER
AGC	AERATED GRIT CHAMBER
C	CHLORINATOR
CCT	CHLORINE CONTACT TANK
IT	IMHOFF TANK
ST	SEPTIC TANK
SDB	SLUDGE DRYING BEDS
OP	OXIDATION POND OR STABILIZATION POND
AP	AERATED POND OR LAGOON
AT	AERATION TANK
TF	TRICKLING FILTER
PC	PRIMARY CLARIFIER OR SEDIMENTATION TANK
SC	SECONDARY CLARIFIER OR SEDIMENTATION TANK
PCD	PRIMARY CLARIFIER-DIGESTER
SD	SLUDGE DIGESTER

Source: Engineering - Science, Inc.

[illegible]

[illegible]

[illegible]

[illegible]

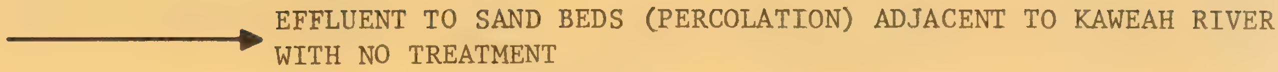
[illegible]

[illegible]

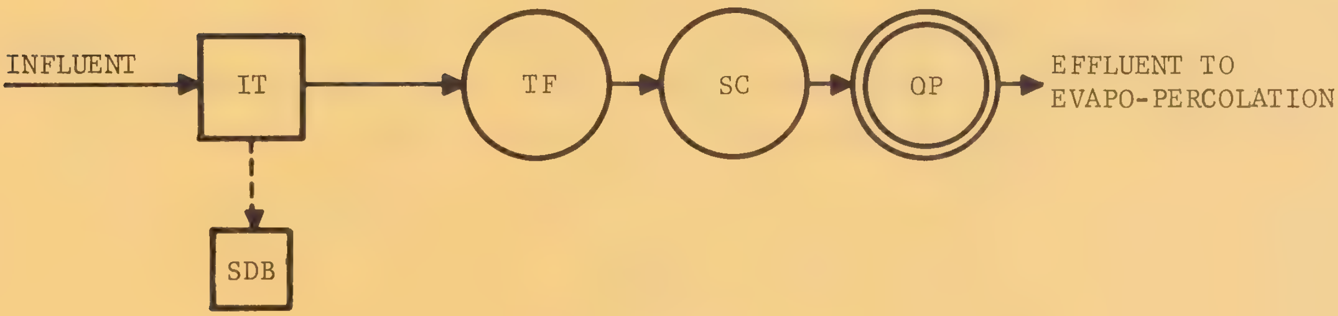
Fig. V-4

Flow Diagrams
Existing Wastewater Treatment Facilities
Tulare County

LEMON COVE

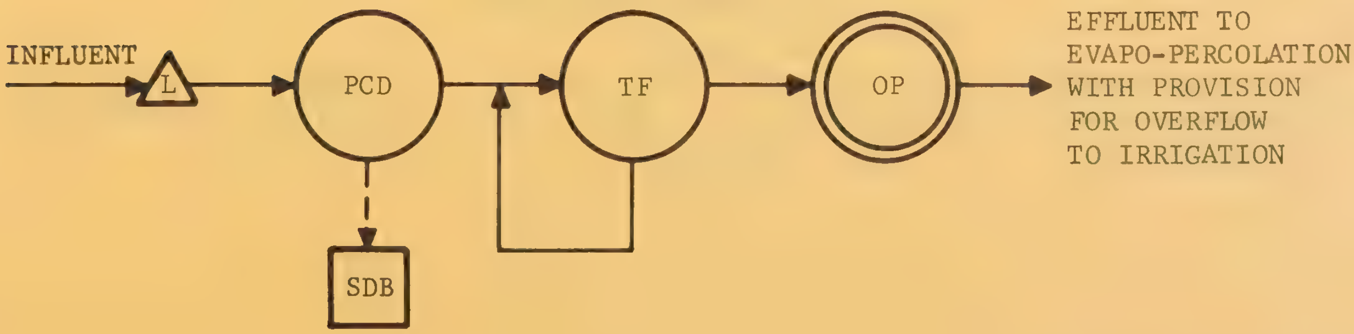


LINNELL FARM CENTER



LONDON

OROSI



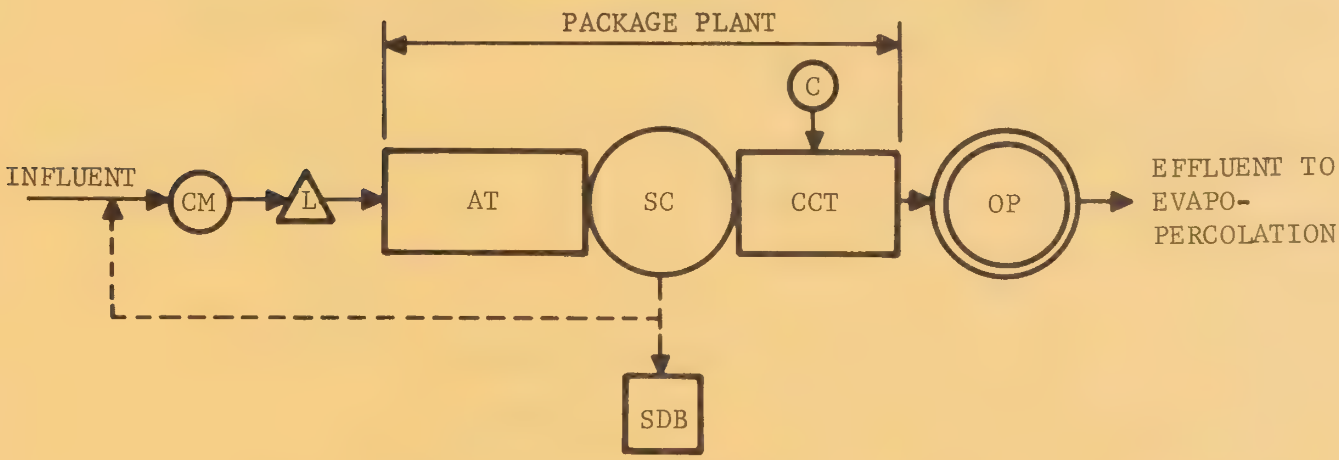
Source: Engineering - Science, Inc.

Fig. V-5

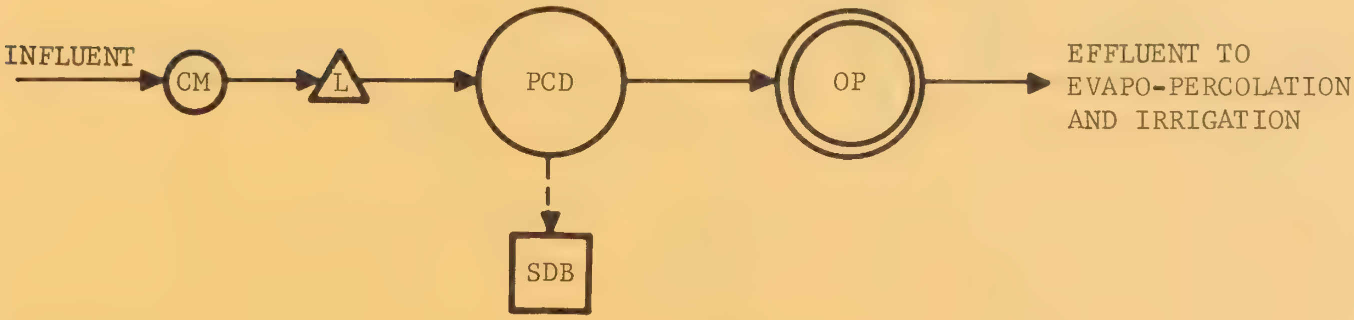
Flow Diagrams
Existing Wastewater Treatment Facilities
Tulare County

PIXLEY

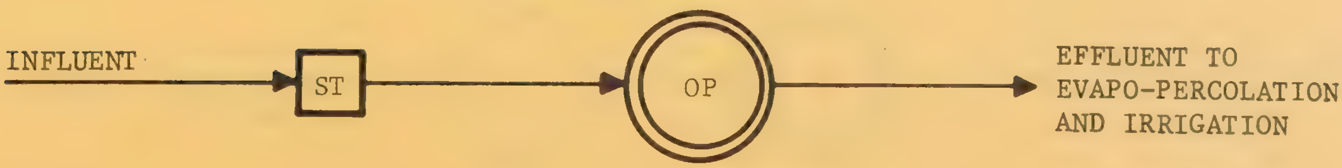
SPRINGVILLE



STRATHMORE



TERRA BELLA

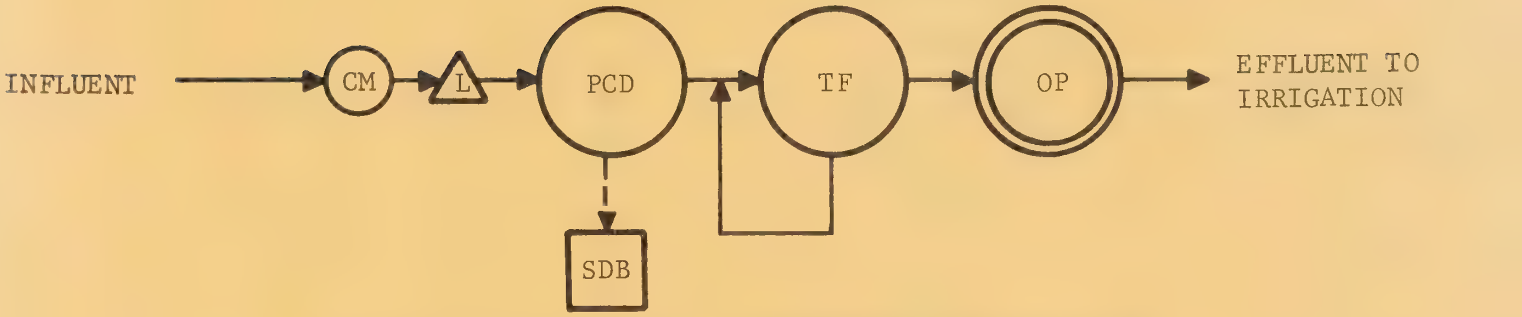


Source: Engineering - Science, Inc.

Fig. V-6

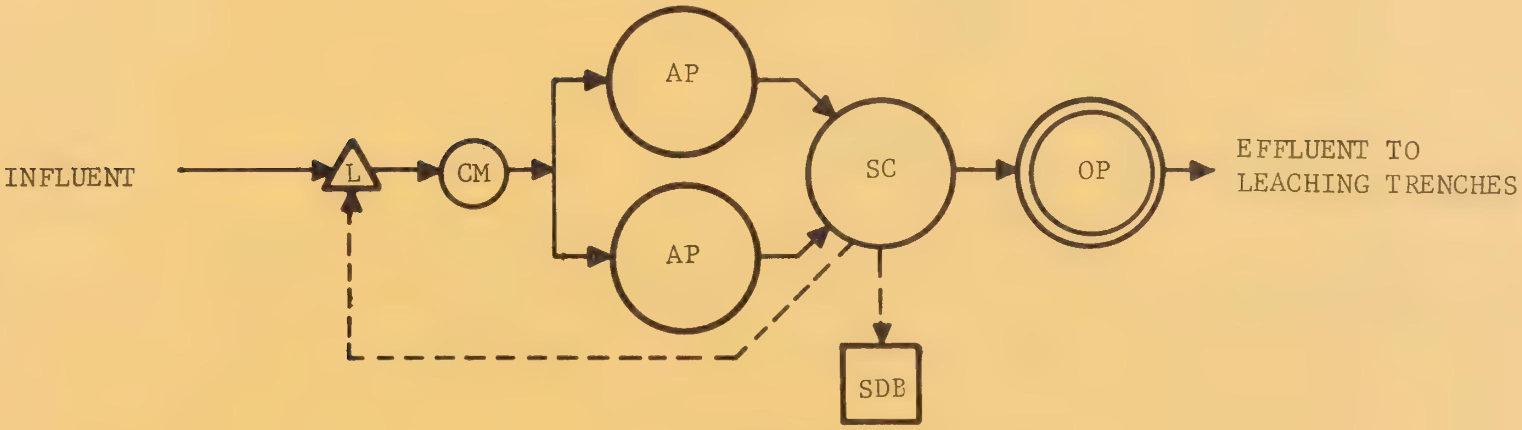
Flow Diagrams
Existing Wastewater Treatment Facilities
Tulare County

TIPTON

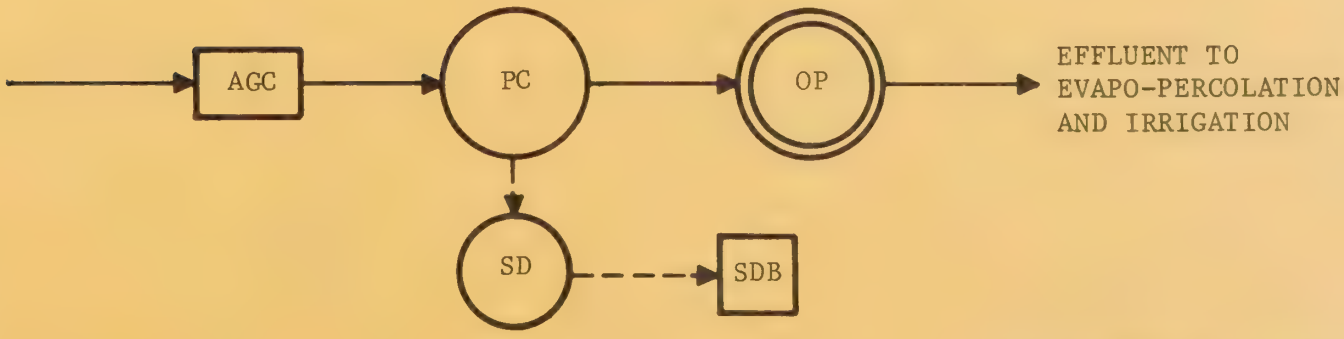


WOODVILLE FARM CENTER

WOODVILLE



EXETER

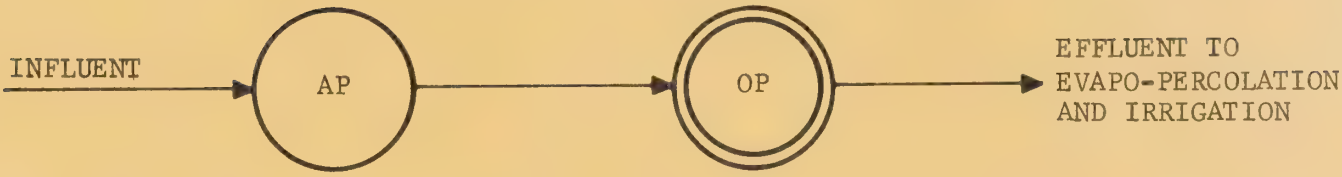


Source: Engineering - Science, Inc.

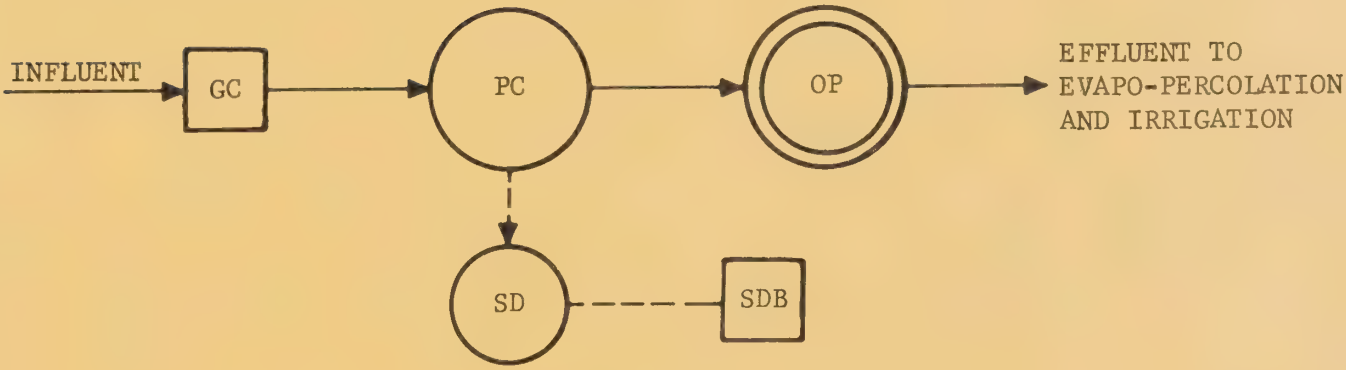
Fig. V-7

Flow Diagrams
Existing Wastewater Treatment Facilities
Tulare County

FARMESVILLE

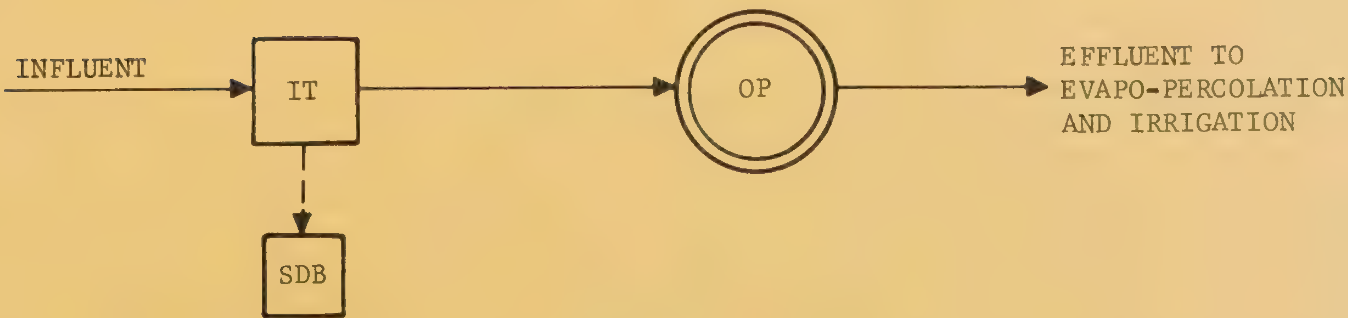


LINDSAY
(Municipal)



LINDSAY
(Industrial)

WOODLAKE



Source: Engineering - Science, Inc.

EXISTING COLLECTION, TREATMENT, AND DISPOSAL FACILITIES

General Description of Systems

The planning area is currently serviced by seventeen wastewater collection, treatment and disposal systems in addition to Lemon Cove which has only a collection system with no treatment of the discharge. The locations and service areas of the existing sewerage systems are shown on Figure VIII-2. The major elements of the systems are indicated on a series of Sewerage System Maps which were prepared in conjunction with this report.

Treatment Methods and Capacities

Descriptions of the existing methods of treatment and the design capacities are presented in Table V-3 and flow diagrams are shown in Figures V-2 through V-7. Reference V-2 was employed as a basis for the definition of terms used in describing methods of treatment and disposal.

All existing treatment systems accomplish secondary treatment to some extent. That is, all systems achieve some level of biological decomposition. Oxidation or stabilization ponds are utilized extensively; however, except for the industrial ponds at Lindsay which are lined, there appears to have been no effort to construct these ponds with impervious membranes, but rather to consider percolation from these ponds as an expeditious means of disposal. A relatively high rate of percolation may have a degrading effect upon the groundwater if a high groundwater table existed and a poorly treated effluent were being disposed of. In the design of oxidation ponds, care should be taken to insure that pond detention times combined with soil flow through times are sufficient to allow for adequate coliform dieaway.

In most instances, the oxidation ponds are preceeded by other means of treatment such as Imhoff Tanks and clarifier-digester treatment units.*

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* See "Glossary of Definitions" in Appendix.

Methods of Effluent Disposal and Disinfection

Table V-4 describes the methods of effluent disposal and disinfection, and indicates the quantity of effluent within each type of disposal system. Flows discharged to septic tanks are based on 100 gallons per capita per day (gcd).

Those facilities which have percolation ponds listed as a method of effluent disposal, actually achieve disposal through the combined effects of percolation and evaporation as is noted.

OPERATIONAL EFFICIENCES AND POTENTIALS FOR ENLARGEMENT

Wastewater Discharge Requirements

Wastewater discharge requirements for the treatment facilities in Tulare County have been established by the California Regional Water Quality Control Board, Central Valley Region (Reference V-3). Three basic requirements have been imposed upon all treatment and disposal systems and these are as follows: (1) neither the treatment facilities nor the waste discharge shall cause a nuisance by reason of odors or unsightliness, (2) the waste discharge shall not cause a pollution of adjacent surface or underlying groundwaters, (3) any of the waste discharge over-flowing to surface waters, surface water channels, or land areas not controlled by the City shall be disinfected to a degree satisfactory to State and Local Health Authorities. Similarly, the State Department of Fish and Game has established minimum requirements for dissolved oxygen content when effluents are discharged to water courses which sustain aquatic life, and the Department of Public Health adds a clause to some wastewater discharge resolutions stating that "no adverse material which endangers life may be added to or may be discharged from the treatment facility" (Reference V-3).

The Regional Water Quality Control Board has expressed concern over the discharge of wastewater which contains large amounts of boron. Discharges of boron resulted from the use of borax and boric acid as a preservative and fungicide to prevent rot in the orange packing process, and boron damage allegedly due to citrus wastewaters was reported in the Ivanhoe, Lemon Cove, and Orange Cove areas (Reference V-8). In order to protect surface and groundwater quality, the Regional Water Quality Control Board established the requirement that waste discharges shall not contain elemental boron in concentrations exceeding 0.5 ppm (parts per million). Subsequently, the utilization of borax and boric acid was discontinued by most packing houses.

TABLE V-3

DESCRIPTION OF TREATMENT SYSTEMS AND DESIGN CAPACITIES
TULARE COUNTY

City, Community, or Tract	Design Capacity Hydraulic (mgd) (1)	Design Capacity Organic (2) BOD (lb/day)	Description of Facilities: Units and Size*	Description of Facilities: Year Constructed
Sub-Planning Area A				
Cutler	0.40		30' Clarifier-digester, 50' trickling filter and 2.0 acres evapo-percolation ponds	1960
Delft Colony			Septic tanks	
East Orosi			Septic tanks	
London	0.008	127 (a)	2 acres of oxidation ponds with diffused aeration system	1968
Monson			Septic tanks	
Orosi	0.40		30' Clarifier-digester, 50' trickling filter, and 2.0 acres evapo-percolation ponds	1965
Seville			Septic tanks	
Sultana			Septic tanks	
Traver			Septic tanks	
Yettem			Septic tanks	

* See "Glossary of Definitions" in Appendix for description of facilities listed in this column.

TABLE V-3 (Continued)

DESCRIPTION OF TREATMENT SYSTEMS AND DESIGN CAPACITIES
TULARE COUNTY

City, Community, or Tract	Design Capacity		Description of Facilities	
	Hydraulic (mgd) (1)	Organic (2) BOD (lb/day)	Units and Size	Year Constructed
Sub-Planning Area B				
Elderwood			Septic tanks	
Exeter			36' Primary clarifier, 16,700 cu. ft. sludge digester, and oxidation ponds totaling 18 acres (b)	1951
Farmersville	1.00		2-Aeration cells with 10 Hp aerators and 2-stabilization ponds (c) totaling six acres	1969
Goshen			Septic tanks	
Ivanhoe	0.50	850	36' Clarigester, 3 oxidation ponds, & sludge drying bed totaling 5 acres	1953
Lemon Cove			Existing collection system, but no treatment facilities	1892 (d)
Lindcove			Septic tanks	
Linnell Farm Center	0.10	292	Imhoff tank, 50' trickling filter, secondary clarifier, and 1.4 acres of oxidation ponds	1939
Patterson Tract			Septic tanks	
Oak Ranch			Septic tanks	

TABLE V-3 (Continued)

DESCRIPTION OF TREATMENT SYSTEMS AND DESIGN CAPACITIES
TULARE COUNTY

City, Community, or Tract	Design Capacity		Description of Facilities	
	Hydraulic (mgd) (1)	Organic (2) BOD (lb/day)	Units and Size	Year Constructed
Tooleville			Septic tanks	
Woodlake	0.53	595	Imhoff tank with holding lagoons of 72 acre-foot capacity (e)	1950
Tract 92			Septic tanks	
Sub-Planning Area C				
Waukena			Septic tanks	
Tract 51			Septic tanks	
Tract 104			Septic tanks	
Sub-Planning Area D				
Lindsay (Municipal)	1.20 (f)		Grit chamber, 45' dia. primary clarifier, septic tank converted to digester, and 22 acres of oxidation ponds	1911, 1952
Lindsay (Industrial	(g)		89 acres of lined ponds	1962
Plainview			Septic tanks	
Strathmore	0.20		Primary clarifier-digester, 2 oxidation ponds, and 2 percolation ponds totaling 5.6 acres	
Tonyville			Septic tanks	

TABLE V-3 (Continued)

DESCRIPTION OF TREATMENT SYSTEMS AND DESIGN CAPACITIES
TULARE COUNTY

City, Community, or Tract	Design Capacity: Hydraulic (mgd) (1)	Design Capacity: Organic (2) BOD (lb/day)	Description of Facilities: Units and Size	Description of Facilities: Year Constructed
Sub-Planning Area E				
Allensworth			Septic tanks	
Alpaugh			Septic tanks	
Earlimart		850	35' Clarifier-digester, 45' trickling filter, and 14 acres of oxidation ponds	1959
Pixley			24' Clarigester and 8.5 acres of oxidation ponds	1950
Teviston			Septic tanks	
Tipton	0.48	5,350	25' Clarifier-digester, 40' trickling filter, and 2 acres of oxidation ponds	1960
Woodville		850 (h)	2 Aeration cells with 5 Hp aerators and 2 stabilization ponds (i) totaling six acres	1969
Woodville Farm Center	0.10	292	10,500 cu. ft. Imhoff tank with 50' trickling filter and leaching trenches	1939
Sub-Planning Area F				
Cotton Center			Septic tanks	
Ducor			Septic tanks	

TABLE V-3 (Continued)

DESCRIPTION OF TREATMENT SYSTEMS AND DESIGN CAPACITIES
TULARE COUNTY

City, Community, or Tract	Design Capacity		Description of Facilities	
	Hydraulic (mgd) (1)	Organic (2) BOD (lb/day)	Units and Size	Year Constructed
Poplar			Septic tanks	
Richgrove			Septic tanks	
Terra Bella	0.04	124	Community septic tank with oxidation ponds	1911
Tract 213			Septic tanks	
Sub-Planning Area G				
Camp Nelson			Septic tanks	
Springville			Single structure consisting of aeration tank, settling tank, and chlorine contact tank with an evapo-percolation pond totaling 1.2 acres	1964
Sub-Planning Area H				
Three Rivers			Septic tanks	
Tract 107			Septic tanks	

(1) Average design flows from information contained in available reports and questionnaires, and from interviews.

(2) Organic loading capacities include BOD reduction capacities of aeration units, Imhoff tanks and other units, and stabilization ponds (with sufficient detention time to achieve oxygenation).

(a) From design specifications.

(b) From construction drawings.

(c) Water depth in aeration cells is 10 feet and in the stabilization ponds is 4 feet.

(d) From Reference V-4.

(e) From Reference V-1.

(f) From Reference V-5.

(g) Calculated volumetric capacity of ponds is 135 mg.

(h) Tulare County Liquid Waste Questionnaire.

(i) Water depth in aeration cells is 12 feet and in the stabilization ponds is 6 feet.

TABLE V-4

METHOD OF EFFLUENT DISPOSAL AND DISINFECTION
TULARE COUNTY

City, Community, or Tract	Effluent Disposal					Disinfection	
	Septic (1) Systems (mgd)	Percolation Ponds (2) (mgd)	Irrigation (mgd)	Drain or Creek Name	Drain or Creek Flow (mgd)	Cl_2 (mgd)	Ponds Detention Time (days)
Sub-Planning Area A							
Cutler		0.15	(a)				
Delft Colony	0.04						
East Orosi	0.01						
London				Leaching Trenches	0.07		
Monson	0.01						
Orosi		0.15	(a)				
Seville	0.03						
Sultana	0.03						
Traver	0.04						
Yettem	0.04						

TABLE V-4 (Continued)

METHOD OF EFFLUENT DISPOSAL AND DISINFECTION
TULARE COUNTY

City, Community, or Tract	Effluent Disposal					Disinfection	
	Septic (1) Systems (mgd)	Percolation Ponds (2) (mgd)	Irrigation (mgd)	Drain or Creek Name	Drain or Creek Flow (mgd)	Cl_2 (mgd)	Ponds Detention Time (days)
Sub-Planning Area B							
Elderwood	0.02						
Exeter			0.84				
Farmersville			0.41				
Goshen	0.13						
Ivanhoe			0.32				
Lemon Cove				Kaweah River	0.02		
Lindcove	0.01						
Linnell Farm Center		0.05					
Patterson Tract	0.07						
Oak Ranch	0.02						
Tooleville	0.02						
Woodlake		0.45 (b)	(b)				
Tract 92	0.03						

TABLE V-4 (Continued)

METHOD OF EFFLUENT DISPOSAL AND DISINFECTION
TULARE COUNTY

City, Community, or Tract	Effluent Disposal					Disinfection	
	Septic (1) Systems (mgd)	Percolation Ponds (2) (mgd)	Irrigation (mgd)	Drain or Creek		Cl_2 (mgd)	Ponds Detention Time (days)
				Name	Flow (mgd)		
Sub-Planning Area C							
Waukena	0.02						
Tract 51	0.02						
Tract 104	0.10						
Sub-Planning Area D							
Lindsay (Municipal)		0.75					
Lindsay (Industrial)		1.50 (c)					
Plainview	0.08						
Strathmore		0.20	(d)				
Tonyville	0.02						
Sub-Planning Area E							
Allensworth	0.02						
Alpaugh	0.08						

TABLE V-4 (Continued)

METHOD OF EFFLUENT DISPOSAL AND DISINFECTION
TULARE COUNTY

City, Community, or Tract	Effluent Disposal					Disinfection	
	Septic (1) Systems (mgd)	Percolation Ponds (2) (mgd)	Irrigation (mgd)	Drain or Creek: Name	Drain or Creek: Flow (mgd)	Cl_2 (mgd)	Ponds Detention Time (days)
Earlimart		0.29					
Pixley		0.16	(a)				
Teviston	0.02						
Tipton			0.14				
Woodville		0.10					
Woodville Farm Center				Leaching Trenches	0.04		
Sub-Planning Area F							
Poplar-Cotton Center	0.14						
Ducor	0.03						
Richgrove	0.10						
Terra Bella		0.07					
Tract 213	0.03						

TABLE V-4 (Continued)

METHOD OF EFFLUENT DISPOSAL AND DISINFECTION
TULARE COUNTY

City, Community, or Tract	Effluent Disposal					Disinfection	
	Septic (1) Systems (mgd)	Percolation Ponds (2) (mgd)	Irrigation (mgd)	Drain or Creek		Cl_2 (mgd)	Ponds Detention Time (days)
				Name	Flow (mgd)		
Sub-Planning Area G							
Camp Nelson	0.11						
Springville		0.07	0.08			0.15	
Sub-Planning Area H							
Three Rivers	0.11						
Tract 107	0.01						

(1) Estimated flow discharged to septic tanks based on 100 gcd.
(2) Ponds operate as stabilization ponds with evaporation and percolation.

(a) Possible overflow to irrigation.
(b) From Reference V-6. Effluent is used for irrigation during summer months.
(c) Ponds are sealed and receive brine wastewaters from the California Olive Growers Association. Flow is for an eight month period annually.
(d) Effluent is used for irrigation during summer months (from Reference V-7).

Operational Efficiencies

Evaluation of the operational efficiencies of existing treatment and disposal systems may be approached on two bases which are as follows: (1) the public health perspective as reflected in discharge requirements established by the Regional Water Quality Control Board and local and state health authorities, and (2) the physical and biological performance of the treatment facilities as indicated by total solids removal, reduction in biochemical oxygen demand (BOD), etc.

Because limited information is available regarding effluent characteristics, objective determinations as to the physical and biological performance are not possible at this time. However, in regard to the public health aspects, indications from the Regional Water Quality Control Board and the State Department of Public Health are that most treatment facilities are meeting their waste discharge requirements, and are conforming to the Department of Public Health's standards. Concern is being expressed, however, in regard to the Lemon Cove Sanitary District's policy of discharging untreated sewage on to sand beds adjacent to the Kaweah River, the deteriorated condition of the Terra Bella treatment facility, and odors eminating from the evapo-percolation ponds in Woodlake and industrial evaporation ponds in Lindsay.

The performance characteristics of existing oxidation ponds are of special interest because of the extensive usage of this type of facility. The Soil Conservation Service uses as a basis for determining the compatibility of an area for sewage lagoons the criteria outlined in Appendix B, which is based entirely on soil properties (Reference V-9). This criteria indicates severe limitations in areas of high percolation potential. However, because most disposal systems in the planning area depend upon some degree of percolation to achieve ultimate effluent disposal, additional criteria such as

depth to groundwater, present groundwater characteristics and beneficial uses, and proximity to surface water courses and water wells should also be considered.

As with sewage lagoons, there are several criteria which determine the compatibility of septic tanks and filter fields to a given service area; however, the most important considerations are (1) soil condition, and (2) depth to groundwater. Soils conditions and groundwater depths vary markedly in Tulare County. Nevertheless, in order to determine the probable operational efficiencies of septic tank filter fields, a rating system based on soil limitations and depth to groundwater (see Appendix B) was established by the Soil Conservation Service (Reference V-9). Based on this rating system and the prevailing soil types indicated in the planning area, soil limitation ratings have been determined for both filter fields and sewage lagoons and are listed in Table V-5.

Several areas have in the past experienced difficulties with the leaching processes associated with septic tank systems. In some locations this problem was solved by the formation of sanitation districts and the construction of sewage treatment facilities. Several areas still exist where problems with septic tank systems frequently occur. The Tulare County Health Department (Reference V-10) has indicated several locations where septic tanks do not perform satisfactorily and, therefore, represent a potential pollutional hazard to the residents of the areas involved. Critical locations to be considered in this regard include the communities of Richgrove, Three Rivers, and Traver. Septic tank filter field soil limitation ratings (Table V-5) for these areas are severe, thus confirming reports by the Health Department. The areas of East Orosi, Elderwood, Monson, and Tract 92 pose a potential pollution threat to the groundwater due to the high groundwater table, and the feasibility of

sewering these communities should be considered. Finally, the Tulare County Health Department has suggested that due to the relatively high density of development in the communities of Goshen and Poplar, these areas should be considered top priority for sewerage system development.

Adequacy of Systems and Potentials for Enlargement

Several factors enter into a decision to expand existing treatment facilities. These include: (1) condition of existing facilities, (2) availability of land for expansion, (3) existing type of treatment with respect to present regulatory requirements, and (4) aesthetic considerations such as control of odors and physical setting with respect to nearest inhabited areas. The following presentation considers the status of existing systems with respect to the above factors.

TABLE V-5

SOIL LIMITATIONS AND HYDROLOGIC DATA
TULARE COUNTY

City, Community, or Tract	Soil Limitation Ratings (1) Filter Fields	Sewage Lagoons	Depth (2) to GW (ft)	Ave (3) Temp. (°F)
Sub-Planning Area A				
Cutler-Orosi	severe	severe	30	
Delft Colony	slight	severe	15	
East Orosi	slight	severe	5	
London	moderate	moderate	25	
Monson	slight	severe	5	
Seville	severe	moderate	23	
Sultana	slight	severe	40	
Traver	severe	severe	25	
Yettem	severe	moderate	23	
Sub-Planning Area B				
Elderwood	severe	moderate	5	
Exeter	severe	severe	163	
Farmersville	slight	severe	5	
Goshen	severe	slight	65	
Ivanhoe	slight	severe	54	95/37
Lemon Cove	moderate	severe	8	
Lindcove	severe	severe	10	
Linnell Farm Center	slight	severe	20	
Patterson Tract	moderate	severe	24	
Oak Ranch	slight	severe		
Tooleville	severe	severe		

TABLE V-5 (Continued)

SOIL LIMITATIONS AND HYDROLOGIC DATA
TULARE COUNTY

City, Community, or Tract	Soil Limitation Ratings (1) Filter Fields	Soil Limitation Ratings (1) Sewage Lagoons	Depth (2) to GW (ft.)	Ave (3) Temp. (°F)
Woodlake	severe	severe	24	
Tract 92	slight	severe	5	
Sub-Planning Area C				
Waukena	severe	slight	55	
Tract 51	severe	slight	92	
Tract 104	severe	slight	50	98/38
Sub-Planning Area D				
Lindsay	severe	slight	77	
Plainview	slight	severe	51	
Strathmore	severe	severe	18	
Tonyville	severe	moderate	160	
Sub-Planning Area E				
Allensworth	severe	slight	74	
Alpaugh	severe	severe	82	
Earlimart	severe	slight	185	
Pixley	slight	severe	66	
Teviston	slight	severe	76	
Tipton	severe	slight	60	
Woodville	moderate	moderate	102	
Woodville Farm Center	moderate	moderate	72	

TABLE V-5 (Continued)

SOIL LIMITATIONS AND HYDROLOGIC DATA
TULARE COUNTY

City, Community, or Tract	Soil Limitation Ratings (1) Filter Fields	Soil Limitation Ratings (1) Sewage Lagoons	Depth (2) to GW (ft.)	Ave (3) Temp. (°F)
Sub-Planning Area F				
Ducor	severe	severe	257	
Poplar-Cotton Center	moderate	moderate	92	
Richgrove	severe	severe	234	96/37
Terra Bella	severe	moderate	180	
Tract 213	moderate	severe	15	
Sub-Planning Area G				
Camp Nelson	NA	NA	NA	
Springville	severe	severe		
Sub-Planning Area H				
Three Rivers	severe	severe		
Tract 107	severe	severe		

(1) Refer to Appendix B (Reference V-9).

(2) Average depth to seasonally high groundwater table in vicinity of existing treatment facilities, determined from "Lines of Equal Elevation of Water in Wells, Spring 1970" (Reference V-11).

(3) Average maximum summer and winter temperatures (Reference V-12).

SUB-PLANNING AREA A

Cutler-Orosi

The Cutler and Orosi Public Utility Districts have taken an intercommunity approach to the treatment of domestic sewage. The existing treatment facility is located on a portion of two 40-acre parcels jointly owned by the two districts and is at present operating at about 40 percent of ultimate capacity. At the time of inspection the site was neat and clean, but odors were noticed emanating from the pond area. No problems associated with acquisition of land would be anticipated in the expansion of the treatment facility.

London

Treatment facilities serving the London Community Services District were constructed in 1968 to serve the existing population of 750. Since that time the service population has increased to 976 with no additional expansion of the treatment facilities. Upon inspection, the plant was found to be neat and clean. No noticeable odors were present and vegetative growth control was obvious. However, the blower housing was in need of repair. Additional acreage is owned by the district with no problems anticipated were expansion to occur. Because homes are located in immediate proximity to the treatment facilities, strict odor control is necessary.

SUB-PLANNING AREA B

Exeter

Upgrading of the existing treatment facilities has recently been undertaken by the City of Exeter. At the time of inspection, the site was neat and clean with all equipment in working order. The sludge digester, however, was uncovered with no provision for utilization of gases evolving from the decomposition processes. This resulted in strong odors in the vicinity of the digester. The plant is operating at about 80 percent of design capacity with minor improvements anticipated in the near future. Sufficient acreage is owned by the City to provide for expansion.

Farmersville

The City of Farmersville boasts one of the newest sewage treatment facilities in the county. Operating at about 40 percent capacity, problems have arisen involving fluctuating voltage to the floating aerators and quantities of effluent to be disposed of by crop irrigation. The plant was clean with no offensive odors and precautionary measures are being implemented to prevent odors in the future. Additional acreage was purchased by the City to provide for future expansion; however, the additional acreage is in orchards and is being used for effluent disposal.

Ivanhoe

Two ranches, owned and operated by the Ivanhoe Public Utility District, are irrigated with effluent from the sewage treatment plant. Due to the fact that storm flows are diverted to the sanitary system, there are times when the existing collection system as well as the treatment facility are overloaded. It is anticipated that at some future time separate storm drainage facilities may be constructed to alleviate this problem. At the time of inspection the plant was very clean. Deodorant is utilized for odor control

of the influent and the sludge drying beds are treated with lime during drying periods. To provide for expansion of treatment facilities, either additional acreage must be purchased or available ranch land may be utilized.

Lemon Cove

Concern has been expressed by the State Department of Public Health, the Tulare County Department of Public Health, the Department of Fish and Game, and the Regional Water Quality Control Board over the practice of discharging untreated wastewaters from the community of Lemon Cove to sand beds adjacent to the Kaweah River. Upon inspection it was found that septic conditions existed at the outfall of the collection system with potential for a public health and/or a pollution problem.

Linnell Farm Center

The Linnell Farm Labor Center is operated by the Housing Authority of Tulare County. Portions of the treatment facilities have been reported to be deteriorating (Reference V-13) and a field inspection of the plant indicated that portions of the concrete on the Imhoff tank were spalling, but the remainder of the plant appeared to be in operable condition. No recirculation facilities have been provided on the trickling filter, however, and as a result a minimum of zoogleal matrix* has been formed on the filter media. As a result a minimum of treatment takes place in the filter. The plant was found to be free of odors with a good algal growth in the ponds.

Woodlake

With the encouragement of new industrial growth, the City of Woodlake anticipates that the existing treatment plant will have to be expanded in the near future. Enlargement of the collection system to add approximately 30 percent

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* See "Glossary of Definitions" in Appendix.

additional area to the existing service area is also anticipated. Some complaints have been registered regarding odors during the summer months although no odors were present at the time of inspection. Acreage is available for expansion of the treatment facility.

SUB-PLANNING AREA C

There are no treatment facilities in this area.

SUB-PLANNING AREA D

Lindsay-Municipal

The present status and deficiencies of sewerage facilities in the City of Lindsay are carefully described in Reference V-14. Present peak flows reach approximately 85 percent of design capacity and the need for plant expansion and modification is anticipated in the near future. There are no comminution facilities and grit bypasses the grit chamber at the headworks. The city is desperately in need of a new interceptor and possibly a low lift pump station. Acreage is available for expansion.

Lindsay-Industrial

At present, 89 acres of impervious, evaporation ponds receive 1.0 mgd of brine for an eight month period each year. However, it is anticipated that in the near future a minimum of 225 acres will be required due to higher chloride concentrations in the ponds and increases in the discharge to the ponds. It was found upon inspection that the odor given off by these ponds was almost unbearable. Complaints have been registered in the immediate area and from as far away as the community of Strathmore and the City of Porterville. Indications are that impervious, evaporation ponds will continue to be utilized as the primary means of disposal in the near future with surface aeration being contemplated to control the excessive odors caused by the high organic loading.

Strathmore

The existing wastewater treatment plant serving the Strathmore Public Utilities District is operating at or near design load. The present condition is caused by industrial wastewater flows which are equal to and some-

times exceed the volumes of domestic flow during peak washdown periods. The organic character of these wastewaters is low, but they are high in inorganic suspended solids. Pretreatment by sedimentation at the source is practiced, but problems exist due to lack of proper management of these pretreatment facilities. Improved methods of dealing with industrial wastewaters are being sought at the present time. Upon inspection, the plant was found to be clean and free of offensive odors. Some discoloration of the plant facilities was noted due to suspended particles of polishing rouge derived from a glass polishing process at a local mirror manufacturing plant. Deodorant is utilized in controlling odors. Additional land is owned by the district for anticipated future expansion. No problems are anticipated in achieving future expansion of the treatment facility or portions of the collection system.

SUB-PLANNING AREA E

Earlimart

The Earlimart Public Utility District sewerage system was constructed in 1959 on a site area of 240 acres. At present, the plant is loaded to 60 percent of design capacity with no problems indicated. No major expansions are anticipated in the near future; however, no problems would be expected in the event the facility were to be expanded.

Pixley

Maintenance problems were evidenced upon inspection of the Pixley Public Utility District's treatment facility. Large amounts of scum had built up on the overflow weir of the Clarigester and large particles of suspended matter were flowing over the weir and to the oxidation ponds. The oxidation ponds had large amounts of vegetative growth on the banks and on the bottom and contained little or no water. Offensive odors were present in and around the plant area, and were especially strong in the vicinity of the outfall from the Clarigester. Land is available for expansion.

Tipton

Sewerage facilities for the Tipton Community Services District were constructed in 1960. At the present time the plant is loaded to about one-third of its hydraulic capacity with no planned expansion. A creamery has abandoned its private treatment facility in order to take advantage of the district's treatment facilities and no problems have been encountered. At the time of inspection, a slight odor was noticed, but the wet well and Clarigester were both in need of cleaning. Large scum deposits had built up on both of these units and the only noticeable odors were believed to have been caused by these deposits. No problems with acquisition of land would be anticipated if expansion were to occur in the future.

Woodville

The sewage treatment facility has been operated for the community of Woodville by the Woodville Public Utility District and has been in operation for one and one-half years. It is presently at one-fourth capacity with construction of more connections anticipated in the near future. Upon inspection, it was found to be clean and well kept. Some odor was present, but was believed due to the recent wasting of excess sludge to drying beds. Provisions for emergency overflow have been constructed and a deep water well has been drilled for washdown purposes. Acreage for future expansion has been purchased by the district.

Woodville Farm Center

An in-depth evaluation of the existing treatment facilities has not been performed since the original construction in 1939. The only existing report concerning these facilities (Reference V-13) states the opinion that the failure of these facilities is eminent. A field investigation verified the opinion of this report and also led to the formulation of several independent conclusions.

In addition to the failing structural conditions of the existing facilities, there was evidence that the facilities were not operating as originally intended. There was no evidence of a zoogleal film on the trickling filter with, in fact, no rotation at all of the distributor due to rotting of the influent ports. The secondary clarifier has not been provided with any type of sludge draw-off appurtenances and, according to the caretaker, no sludge has been drawn off in 22 years. A sludge blanket was visible in the clarifier with some solids going over the weirs. Hardpan conditions have caused leachline failures and border ponds have been constructed to effect disposal of the effluent by means of evaporation.

SUB-PLANNING AREA F

Terra Bella

The Terra Bella Sewer Maintenance District has filed for Federal assistance to extend their collection system and construct new sewage treatment facilities. This construction is proposed for the 1972-73 fiscal year. The present facilities were reported to have been overloaded in 1960 and minor improvements only have been made since that date.

SUB-PLANNING AREA G

Springville

Approximately 40 percent of the service area of the Springville Public Utility District remains unsewered at the present time. Construction of an additional stabilization pond and installation of floating aerators in the ponds are being contemplated in the near future to provide for additional capacity. If substantial expansion were to occur, the acquisition of additional acreage would be required.

The facility is located in a flood-prone area but there was no other area available in the Springville vicinity and it was agreed that this location was feasible when proper protection precautions were taken.

CHAPTER SIX

FUTURE WATER DEMANDS AND WASTEWATER QUANTITIES

CHAPTER VI

FUTURE WATER DEMANDS AND WASTEWATER QUANTITIES

INTRODUCTION

In the development of long-range plans for water supply systems and sewerage facilities, determination of future water demands and related sewage flows must be accomplished to provide a basis for design. The purpose of this chapter is to establish the basis for determination of future water demands and wastewater quantities and to present these future flow requirements in a useful form.

FUTURE WATER QUANTITY REQUIREMENTS

General

In the development of future water needs for the communities within the county, several variables must be taken into consideration. One of the most important factors which will influence the priorities for expanded development will be the cost and availability of water in the future. There is also some likelihood of reduced water use in industrial applications due to changes in technology; however, a significant factor to be recognized in developing flow demands for the future in the planning area is the present and projected economic and physical profile of the various communities as articulated in the various county-wide planning programs. Indeed the passage of AB 1301 clarifies the legislative commitment to sustain and bolster the general plan concept at the local level. The consideration of these problems in the development of future water requirements will also influence the design of the supply facilities, transmission and distribution mains, and facilities to provide service during emergency conditions.

BASIS FOR DETERMINING FUTURE WATER DEMANDS

Maximum Day Demands

In estimating future water demands, historical water consumption generally provides a sound basis for estimation. Records of existing flows were researched and per capita flows were calculated for those communities under the jurisdiction of the California State Department of Public Health. These figures were tabulated and are presented in Appendix C (Reference VI-1). Unfortunately, other communities do not have an established system of record keeping. For purposes of this study, these communities, along with the areas serviced by private wells, are assumed to utilize water at rates similar to those already established. On that premise, the following design bases were used in determining future maximum day water demands for the planning area: For those areas with established per capita consumption rates, the established rate, modified by a five percent increase per design period, was used. For all other areas, the 1980 flow projections were based on the Improvement Standards of Tulare County (Reference VI-2) which state that a water supply source, excluding storage facilities, shall supply a minimum of 900 gallons per service connection per 24 hours. The 1980 per capita demand utilized, therefore, was 330 gcd (gallons per capita per day) and was increased by five percent for 1990.

As the demand for water from municipal and agricultural interests increases, it is anticipated that the unit cost of water will also increase. In areas where this trend has been established, the practice of installing water meters to curb waste has been implemented. It is anticipated that this system will continue in areas where significant increases in per capita consumption occur, and if implemented in some portions of Tulare County, the above projected per capita consumption could be decreased in those areas. This decrease in per capita consumption would result in a more efficient use of existing facilities and an overall decrease in total water demands.

Fire Flow Demands

In order to be recognized for grading purposes, the National Board of Fire Underwriters has set the delivery of at least 250 gpm at the fire hose nozzle for a period of two hours, as a minimum for fire protection. This flow has been exceeded, however, by Tulare County standards which indicate a sustained flow of 500 gpm for a two hour period as a minimum. The county standard has therefore been set as a minimum for design purposes in this chapter.

Specific fire flow requirements for improvement are set by the Pacific Fire Rating Bureau at the time a rating program is conducted. Coincidently, Tulare County is undergoing a re-evaluation of its fire ratings at the time of this writing. These programs are conducted, where desired, for the purpose of establishing fire insurance rates and involve the consideration of several items upon which fire protection is dependent. Some of these considerations include total available water supply, available water supply from supply sources with standby power, and storage facilities capable of supplying water during emergency conditions. Fire ratings are also influenced by current structural conditions and the degree of congestion of buildings (area of ground covered by buildings as well as height of buildings).

Fire flow demands were calculated for communities of greater than 250 population using the following formula:

$$G = 1{,}020\ (P)^{1/2}\ (1.0 - 0.01\ (P)^{1/2})$$

where: G = Required fire flow in gpm
P = Population in thousands

The required fire flow duration is dependent both upon the magnitude of the fire flow and the designated land use to be served. Table VI-1 presents a general breakdown of required fire flow durations for various fire flows. A minimum fire flow duration of two hours was assumed for fire flows of less than 1,000 gpm.

TABLE VI-1

REQUIRED FIRE FLOW DURATION

Approximate Population	Fire Flow (1) gpm	Required Duration (hours)
1,000	1,000	4
2,000	1,500	6
3,000	1,750	7
4,000	2,000	8
5,000	2,250	9
6,000	2,500	10
10,000	3,000	10

(1) From Reference VI-3

Projected Water Demands for 1980 and 1990

Utilizing population projections as developed in Chapter III and the above-stated bases, projected water demands for the years 1980 and 1990 were developed and are presented in Tables VI-2 and VI-3. Projected water demand requirements for maximum day plus fire flow were determined.

TABLE VI-2

PROJECTED COMMUNITY WATER REQUIREMENTS - 1980
TULARE COUNTY

City, Community, or Tract	Total (1) 1980 Population	Maximum Day Flow (gpm)	Required (2) Fire Flow (gpm)	Maximum Day + Fire Flow (gpm)
Sub-Planning Area A				
Cutler-Orosi	7,260	3,025	2,660	5,685
Delft Colony	400	93	640	733
East Orosi	60	14	500	514
London	800	97	900	997
Monson	60	14	500	514
Seville	300	69	555	624
Sultana	250	57	500	557
Traver	400	93	640	733
Yettem	350	80	600	680
Sub-Planning Area B				
Elderwood	270	62	530	592
Exeter	6,410	1,920	2,520	4,440
Farmersville	5,460	1,250	2,320	3,570
Goshen	1,860	343	1,370	1,713
Ivanhoe	1,575	270	1,260	1,530
Lemon Cove	200	46	500	546
Lindcove	140	32	500	532
Linnell Farm Center	660	151	820	971
Patterson Tract	728	167	860	1,027
Oak Ranch	185	42	500	542
Tooleville	130	30	500	530
Woodlake	5,760	1,750	2,380	4,130
Tract 92	325	75	570	645
Sub-Planning Area C				
Waukena	130	30	500	530
Tract 51	140	32	500	532
Tract 104	(a)			
Sub-Planning Area D				
Lindsay	10,390	4,465	3,180	7,645
Plainview	842	193	930	1,123
Strathmore	1,350	410	1,170	1,580
Tonyville	150	34	500	534

TABLE VI-2 (Continued)

PROJECTED COMMUNITY WATER REQUIREMENTS - 1980
TULARE COUNTY

City, Community, or Tract	Total (1) 1980 Population	Maximum Day Flow (gpm)	Required (2) Fire Flow (gpm)	Maximum Day + Fire Flow (gpm)
Sub-Planning Area E				
Allensworth	140	41	500	541
Alpaugh	600	138	780	918
Earlimart	3,300	760	1,810	2,570
Pixley	1,900	242	1,380	1,622
Teviston	150	34	500	534
Tipton	1,000	308	1,020	1,328
Woodville	1,000	230	1,020	1,250
Woodville Farm Center	565	107	760	867
Sub-Planning Area F				
Ducor	300	69	560	629
Poplar-Cotton Center	1,300	350	1,150	1,500
Richgrove	1,170	268	1,090	1,358
Terra Bella	1,100	252	1,060	1,312
Tract 213	307	70	560	630
Sub-Planning Area G				
Camp Nelson	1,500	344	1,230	1,574
Springville	1,700	472	1,310	1,782
Sub-Planning Area H				
Three Rivers (b)	2,035 (c)	466	1,430	1,896

(1) From Chapter III.
(2) From Reference VI-3.

(a) Assumes incorporation into the City of Tulare.
(b) Includes Tract 107.
(c) Based on normal growth expectations for 1990 of 4,000 and making no assumptions with regard to water service or sewage disposal.

TABLE VI-3

PROJECTED COMMUNITY WATER REQUIREMENTS - 1990
TULARE COUNTY

City, Community, or Tract	Total (1) 1990 Population	Maximum Day Flow (gpm)	Required (2) Fire Flow (gpm)	Maximum Day + Fire Flow (gpm)
Sub-Planning Area A				
Cutler-Orosi	8,400	3,675	2,860	6,535
Delft Colony	350	84	600	684
East Orosi	20	5	500	505
London	800	102	900	1,002
Monson	20	5	500	505
Seville	250	60	500	560
Sultana	200	48	500	548
Traver	400	96	640	736
Yettem	350	84	600	684
Sub-Planning Area B				
Elderwood	300	72	560	632
Exeter	7,400	2,320	2,700	5,020
Farmersville	7,290	1,760	2,670	4,430
Goshen	2,400	464	1,550	2,014
Ivanhoe	1,300	236	1,150	1,386
Lemon Cove	300	72	560	632
Lindcove	100	24	500	524
Linnell Farm Center	660	159	821	980
Patterson Tract	700	169	850	1,019
Oak Ranch	180	43	500	543
Tooleville	40	10	500	510
Woodlake	8,190	2,600	2,840	5,440
Tract 92	300	72	560	632
Sub-Planning Area C				
Waukena	100	24	500	524
Tract 51	100	24	500	524
Tract 104	(a)			
Sub-Planning Area D				
Lindsay	13,300	6,020	3,570	9,590
Plainview	750	181	870	1,051
Strathmore	1,500	480	1,230	1,710
Tonyville	50	12	500	512

TABLE VI-3 (Continued)

PROJECTED COMMUNITY WATER REQUIREMENTS - 1990
TULARE COUNTY

City, Community, or Tract	Total (1) 1990 Population	Maximum Day Flow (gpm)	Required (2) Fire Flow (gpm)	Maximum Day + Fire Flow (gpm)
Sub-Planning Area E				
Allensworth	100	31	500	531
Alpaugh	400	96	640	736
Earlimart	3,500	840	1,870	2,710
Pixley	2,100	282	1,450	1,732
Teviston	50	12	500	512
Tipton	1,050	347	1,030	1,377
Woodville	1,000	241	1,000	1,241
Woodville Farm Center	565	113	760	873
Sub-Planning Area F				
Ducor	340	82	590	672
Poplar-Cotton Center	900	252	960	1,212
Richgrove	1,300	314	1,150	1,464
Terra Bella	1,200	289	1,100	1,389
Tract 213	300	72	560	632
Sub-Planning Area G				
Camp Nelson	1,900	457	1,390	1,847
Springville	1,900	554	1,390	1,944
Sub-Planning Area H				
Three Rivers (b)	4,000	964	2,000	2,964

(1) From Chapter III.
(2) From Reference VI-3.

(a) Assumes incorporation into the City of Tulare.
(b) Includes Tract 107.

FUTURE QUANTITIES AND CHARACTERISTICS OF WASTEWATERS

In the development of a comprehensive county-wide wastewater management plan the volume and characteristics of wastewaters ultimately expected to be generated must be evaluated. The population projections and applicable per capita flow rate data were the basic criteria used in the calculation of future domestic wastewaters. Because the characteristics and volumes of industrial wastewaters may significantly influence the design and operation of wastewater treatment facilities, the nature of existing and projected future industrial wastes have also been investigated.

Projected Wastewater Quantities

Future sewage flows have been estimated by applying projected per capita flow rates to the discrete populations forecasted. These predicted populations were initially developed and presented in Chapter III and are presented again in conjunction with projected flows in Tables VI-4 and VI-5. In areas where measured per capita flows were not available and modest increases or declines in population are anticipated, a per capita flow basis of 100 gcd was used to project future domestic flows. In areas where substantial population increases are projected, however, it is expected that there will be a small increase in the domestic per capita flow. To provide for this increase, the 100 gcd was increased by an additional five gcd per design period. For those areas where determined per capita flow rates were well below 100 gcd and where population increases are anticipated, the present per capita flow rate was increased by 10 percent per design period.

Industrial flow projections have been estimated by increasing the existing flow by 10 percent per design period. This basis does not provide for substantial industrial expansion, but does allow for modest increases within existing facilities.

It should be noted that the present and future per capita flows for the communities of Farmersville and Ivanhoe do not follow an orderly pattern of progression. The per capita flow reported in Table V-1 for Farmersville was measured during initial operation of the new plant when only a portion of the service population was connected and would not be representative of the present per capita flow. The projected per capita flow was therefore adjusted to conform to the 100 gcd basis for future design periods. The reduction to 100 gcd of the per capita flow rate for Ivanhoe is based on the assumption that at some time in the near future storm flows will be separated from the sanitary sewer collection system.

Wastewater Characteristics

Because wastewater characteristics influence, to a substantial degree, the type and extent of treatment required to produce an acceptable effluent, it is essential to define the anticipated characteristics of future wastewaters. The characteristics of existing industrial discharges have been established by field investigations involving discussions with treatment plant operators and from existing reports.

The most significant waste-producing industries in the planning area are vegetable and fruit packers, meat packers, and processors of dairy products. Citrus packing house wastewaters are generally characterized by organic concentrations of 20-50 mg/l of BOD_5 (five day biochemical oxygen demand) in addition to high concentrations of detergents used in washing the produce. Organic concentrations of wastewaters produced by meat packing concerns within the planning area are generally high (700 mg/l BOD_5), however, flows are usually small. These low flows along with the wasting of blood account in part for the high strength. Characteristics of milk processing wastewaters, similar to those generated in Tipton, have been tested at organic concentra-

tions in excess of 1,000 mg/1 of BOD_5. For purposes of this study 700 mg/1 of BOD_5 was utilized. In areas where ordinances have been established concerning pretreatment of certain industrial wastewaters these values have been adjusted accordingly.

Domestic flows may reasonably be expected to exhibit characteristics and composition common to domestic wastewaters as described in Chapter V. It has been assumed, for those areas where the population is projected to stabilize or experience a decrease, that the organic concentration of 200 mg/1 of BOD_5 will continue to be exemplary. For those areas where substantial increases in population are anticipated, organic concentrations are projected to increase at the rate of 20 mg/1 of BOD_5 per design period. This increase provides for increased concentrations from domestic sources as well as from commercial establishments as a result of the population increases.

TABLE VI-4

PROJECTED WASTEWATER QUANTITIES AND CHARACTERISTICS - 1980
TULARE COUNTY

City, Community, or Tract	Total (1) 1980 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (2) Total (lbs/day)
		Flow (mgd)	BOD (mg/l)	Per Capita (gcd)	Flow (mgd)	BOD (mg/l)	
Sub-Planning Area A							
Cutler-Orosi	7,260	0.48	220	66			880
Delft Colony	400	0.04	200	100			70
East Orosi	60	0.01	200	100			20
London	800	0.08	220	100			150
Monson	60	0.01	200	100			20
Seville	300	0.03	200	100			50
Sultana	250	0.03	200	100			50
Traver	400	0.04	220	100			70
Yettem	350	0.04	200	100			70
Sub-Planning Area B							
Elderwood	270	0.03	220	100			60
Exeter	6,410	0.67	220	105	0.44	100 (c)	1,600

TABLE VI-4 (Continued)

PROJECTED WASTEWATER QUANTITIES AND CHARACTERISTICS - 1980
TULARE COUNTY

City, Community, or Tract	Total (1) 1980 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (2) Total (lbs/day)
		Flow (mgd)	BOD (mg/l)	Per Capita (gcd)	Flow (mgd)	BOD (mg/l)	
Farmersville	5,460	0.57	220	105			1,050
Goshen	1,860	0.19	220	100			350
Ivanhoe	1,575	0.16	200	100	0.10	50 (c)	310
Lemon Cove	200	0.02	220	100			40
Lindcove	140	0.01	200	100			20
Linnell Farm Center			410	77			
Patterson Tract	728	0.07	200	100			120
Oak Ranch	185	0.02	200	100			30
Tooleville	130	0.01	200	100			20
Woodlake	5,760	0.60	220	105	0.12	800 (c)	1,900
Tract 92	325	0.03	200	100			
Sub-Planning Area C							
Waukena	130	0.01	200	100			20
Tract 51	140	0.01	200	100			20
Tract 104	(b)						

TABLE VI-4 (Continued)

PROJECTED WASTEWATER QUANTITIES AND CHARACTERISTICS - 1980
TULARE COUNTY

City, Community or Tract	Total (1) 1980 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (2)
		Flow (mgd)	BOD (mg/l)	Per Capita (gcd)	Flow (mgd)	BOD (mg/l)	Total (lbs/day)
Sub-Planning Area D							
Lindsay (Municipal)	10,390	1.09	220	105	0.25	400 (c)	2,830
Lindsay (Industrial)					1.5	1,300 (c)	16,260
Plainview	842	0.08	200	100			130
Strathmore	1,350	0.14	220	100	0.09	50 (c)	300
Tonyville	150	0.02	200	100			30
Sub-Planning Area E							
Allensworth	140	0.01	200	100			20
Alpaugh	600	0.06	200	100			100
Earlimart	3,300	0.34	220	103			620
Pixley	1,900	0.19	220	100			350
Teviston	150	0.02	200	100			30
Tipton	1,000	0.10	220	100	0.05	700	475
Woodville	1,000	0.10	200	100			170
Woodville Farm Center			288	73			

TABLE VI-4 (Continued)

PROJECTED WASTEWATER QUANTITIES AND CHARACTERISTICS - 1980
TULARE COUNTY

City, Community, or Tract	Total (1) 1980 Population	Origin and Average Characteristics					BOD (2) Total (lbs/day)
		Domestic			Industrial		
		Flow (mgd)	BOD (mg/l)	Per Capita (gcd)	Flow (mgd)	BOD (mg/l)	
Sub-Planning Area F							
Ducor	300	0.03	220	100			60
Poplar - Cotton Center	1,300	0.13	200	100			220
Richgrove	1,170	0.12	220	100			220
Terra Bella	1,100	0.08	246	74			160
Tract 213	307	0.03	200	100			50
Sub-Planning Area G							
Camp Nelson	1,500	0.15	220	100			280
Springville	1,700	0.17	220	100			310
Sub-Planning Area H							
Three Rivers (a)	2,035	0.20	220	100			370

(1) From Chapter III.
(2) Average daily BOD loading including seasonal industrial wastewaters.
(a) Includes Tract 107.
(b) Assumes incorporation into the City of Tulare.
(c) Industrial wastes characterized by both high dissolved and suspended solids.

TABLE VI-5

PROJECTED WASTEWATER QUANTITIES AND CHARACTERISTICS - 1990
TULARE COUNTY

City, Community, or Tract	Total (1) 1990 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (2)
		Flow (mgd)	BOD (mg/1)	Per Capita (gcd)	Flow (mgd)	BOD (mg/1)	Total (1bs/day)
Sub-Planning Area A							
Cutler-Orosi	8,400	0.61	240	73			1,220
Delft Colony	350	0.04	200	100			70
East Orosi	20		200	100			
London	800	0.08	220	100			150
Monson	20		200	100			
Seville	250	0.03	200	100			50
Sultana	200	0.02	200	100			30
Traver	400	0.04	220	100			70
Yettem	350	0.04	200	100			70
Sub-Planning Area B							
Elderwood	300	0.03	240	100			60
Exeter	7,400	0.81	240	110	0.48	100 (c)	2,020

TABLE VI-5 (Continued)

PROJECTED WASTEWATER QUANTITIES AND CHARACTERISTICS - 1990
TULARE COUNTY

City, Community, or Tract	Total (1) 1990 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (2)
		Flow (mgd)	BOD (mg/1)	Per Capita (gcd)	Flow (mgd)	BOD (mg/1)	Total (lbs/day)
Farmersville	7,290	0.80	240	110			1,600
Goshen	2,400	0.24	240	100			480
Ivanhoe	1,300	0.13	200	100	0.11	50	270
Lemon Cove	300	0.03	240	100			60
Lindcove	100	0.01	200	100			20
Linnell Farm Center			410	85			
Patterson Tract	700	0.07	200	100			120
Oak Ranch	180	0.02	200	100			30
Tooleville	40		200	100			
Woodlake	8,190	0.90	240	110	0.13	800	2,670
Tract 92	300	0.03	200	100			50
Sub-Planning Area C							
Waukena	100	0.01	200	100			20
Tract 51	100	0.01	200	100			20
Tract 104	(b)						

TABLE VI-5 (Continued)

PROJECTED WASTEWATER QUANTITIES AND CHARACTERISTICS - 1990
TULARE COUNTY

City, Community, or Tract	Total (1) 1990 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (2)
		Flow (mgd)	BOD (mg/l)	Per Capita (gcd)	Flow (mgd)	BOD (mg/l)	Total (lbs/day)
Sub-Planning Area D							
Lindsay (Municipal)	13,300	1.46	240	110	0.27	400	3,820
Lindsay (Industrial)					2.0	1,300	21,684
Plainview	750	0.08	200	100			130
Strathmore	1,500	0.15	240	100	0.10	50	340
Tonyville	50		200	100			
Sub-Planning Area E							
Allensworth	100	0.01	200	100			20
Alpaugh	400	0.04	200	100			70
Earlimart	3,500	0.40	240	113			800
Pixley	2,100	0.21	240	100			420
Teviston	50		200	100			
Tipton	1,050	0.11	240	100	0.06	700	570
Woodville	1,000	0.10	200	100			170
Woodville Farm Center			288	80			

TABLE VI-5 (Continued)

PROJECTED WASTEWATER QUANTITIES AND CHARACTERISTICS - 1990
TULARE COUNTY

City, Community, or Tract	Total (1) 1990 Population	Origin and Average Characteristics					
		Domestic			Industrial		BOD (2)
		Flow (mgd)	BOD (mg/l)	Per Capita (gcd)	Flow (mgd)	BOD (mg/l)	Total (lbs/day)
Sub-Planning Area F							
Ducor	340	0.03	240	100			60
Poplar-Cotton Center	900	0.09	200	100			150
Richgrove	1,300	0.13	240	100			260
Terra Bella	1,200	0.10	246	81			205
Tract 213	300	0.03	200	100			50
Sub-Planning Area G							
Camp Nelson	1,900	0.19	240	100			380
Springville	1,900	0.19	240	100			380
Sub-Planning Area H							
Three Rivers (a)	4,000	0.40	240	100			800

(1) From Chapter III.
(2) Average daily BOD loading including seasonal industrial wastewaters.

(a) Includes Tract 107.
(b) Assumes incorporation into the City of Tulare.
(c) Industrial wastes characterized by both high dissolved and suspended solids.

CHAPTER SEVEN

WATER QUALITY MANAGEMENT OBJECTIVES, DESIGN CONSIDERATIONS, AND COST EXTIMATING BASIS

CHAPTER VII

WATER QUALITY MANAGEMENT OBJECTIVES, DESIGN CONSIDERATIONS AND COST ESTIMATING BASIS

GENERAL

The purposes of this chapter are: (1) to develop basic parameters for determining water and sewerage system expansion requirements, (2) to present design criteria and define the basis for sizing major elements of the various systems, and (3) to set forth the capital cost estimating basis.

Water quality management objectives and projected wastewater discharge requirements are generally discussed to provide a basis for establishing the necessary level of performance of future systems.

It is anticipated that this report will be instrumental in establishing the basis for preparation of final engineering designs, and because final designs must conform to the requirements of certain control agencies, the design parameters presented herein were determined to be in reasonable conformity with design constraints which may be imposed by these control agencies.

WATER QUALITY OBJECTIVES AND DISCHARGE REQUIREMENTS

Water Quality Management Goals

The "Interim Water Quality Management Plan for the Central Valley Region" (Reference VII-1) describes the goals of the California Regional Water Quality Control Board, Central Valley Region. These goals are restated for reference purposes in Appendix D.

PROJECTED WASTEWATER DISCHARGE REQUIREMENTS

In the past decade discharge requirements set forth by the California Regional Water Quality Control Boards have undergone significant changes toward more stringent limits and more determined and deliberate application. These intensified efforts have no doubt, been a reflection of accelerated public awareness and corresponding concern about water pollution and its effects upon the environment. As the concern of the State Legislature expands, it is only natural to expect further refinements in quality criteria for effluent discharge, plant design, construction and operation, etc., in the coming years. Such refinements will be particularly influenced by advancements in wastewater treatment technology. These advances are expected to come about as research and development assumes a greater role in this field.

It may be reasonably anticipated that future requirements (perhaps after 1980) will place a greater emphasis on limiting total dissolved salts. Should desalinization technology advance at a faster pace, imposition of stricter salinity limits may be expected to occur earlier. Increased demands for fresh water in the future years will also exert greater impetus for lower salt quantities allowed within the groundwater and surface streams.

Water Supply System Objectives

At the present time, water quality objectives and waste discharge requirements within the planning area reflect, to a large degree, those which would be associated with discharges to an open body of water. Effluent discharge standards have been set which are dependent on additional dilution and dispersion which may be provided by the bodies of water into which such effluents may be discharged. This procedure does not envision the Tulare Basin typical sewage treatment plant which depends to a greater or lesser degree upon percolation into the soil mantle as a part of the wastewater disposal system

at the site of the treatment plant. The final disposition of a large percentage of wastewater effluents in the Basin (except for such amounts as are dispersed by evaporation or leave the basin as excess irrigation water) is into the groundwater as recharge waters from irrigation systems.

As more and more wastewater percolates into the groundwater because of increased settlement densities, the capacity of the soil mantle to provide proper filtration lessens and there arises a real possibility of contamination of the groundwater systems. It is, therefore, believed that the present objectives should be augmented to take into consideration the long-term effects of waste discharges on the groundwater.

The implementation of these objectives would provide some assurance that domestic water supplies will be wholesome, safe and potable for future generations. Several additional objectives should be implemented to assure that water will be available in adequate quantities and at sufficient pressures in order to accommodate forecasted growth patterns as indicated in the various general plan programs. These objectives would include consideration of providing assistance to water supply systems in case of emergencies or breakdown, investigation of consumer complaints of poor water quality and suspected waterborne illnesses such as typhoid fever, bacillary dysentary, infectious hepatitus and tularemia, and the implementation of surveillance and preventative control measures to achieve maximum safety and wholesomeness of domestic waters. The extension of public water delivery systems to urban areas is recommended in order to provide a sound, adequate and monitorable supply to these areas for both domestic and fire suppression purposes. In addition, consideration should be given to the fluoridation of all public water supplies within the county for the purpose of possibly reducing dental caries. (Reference VII-2).

WATER QUALITY OBJECTIVES

The United States Public Health Service has established minimum drinking water standards for water supplies. A summary of the more common constituents and their maximum acceptable concentrations of concern is presented in Table VII-1. For this study, minimum levels of water quality for municipal purposes will be those set forth by the USPHS.

TABLE VII-1

UNITED STATES PUBLIC HEALTH SERVICE

DRINKING WATER STANDARDS

Substance	Maximum Acceptable Concentration (mg/l)
Alkyl Benzene Sulfate (ABS)	0.5
Arsenic (AS)	0.01
Carbon Chloroform Extract (CCE)	0.2
Chloride (Cl)	250
Copper (Cu)	1.0
Cyanide (CN)	0.01
Fluoride (F)	0.8-1.7
Iron (Fe)	0.3
Manganese (Mn)	0.05
Nitrate (NO_3)	0.001
Phenols	0.001
Sulfate (SO_4)	250
Total Dissolved Solids	500
Zinc (Zn)	5.0

The constituents and their maximum acceptable concentrations presented in Table VI-1 are only a summary and are far from exhaustive. Characteristics

such as temperature and acidity are also important and some constituents which tend to accumulate within the system would be considered unacceptable at any concentration.

In addition to these standards, water quality for agricultural waters must be considered. In many cases, quality standards for irrigation waters are more restrictive than those for drinking water. Concentrations of boron and chloride and other characteristics such as the sodium ratio are critical in irrigation waters (see Table VII-2). Acceptable characteristics for irrigation waters are variable depending primarily on a particular combination of the type of crop and soil condition. For this reason, the establishment of minimum quality levels for agricultural waters should generally be determined for each individual application. For purposes of general classification, however, a qualitative scheme of classification or irrigation waters has been developed (Reference VII-1) and is presented in Table VII-2. This classification is intended to be general in nature and should be utilized with this consideration in mind.

TABLE VII-2

QUALITATIVE CLASSIFICATION OF IRRIGATION WATERS (1)

	Class I Excellent to Good	Class II Good to Injurious	Class III Injurious to Unsatisfactory
$K \times 10^5$ at 25° C	Less than 100	100 - 300	More than 300
Boron, ppm	Less than 0.5	0.5 - 2.0	More than 2.0
Sodium, percentage	Less than 60	60 - 75	More than 75
Chloride, m.e.	Less than 5	5 - 10	More than 10

(1) From reference VII-1.

WATER SUPPLY SYSTEM DESIGN CONSIDERATIONS

Total requirements for future water supplies were calculated in Chapter VI utilizing maximum day plus fire flow demands for design purposes. When compared with existing water supplies, the total demands will indicate the deficiencies in supplying the required production.

Groundwater Supply

In the development of a groundwater supply, the information on which the number, size and location of wells are based includes knowledge of the topography and geology of the region and the depth and safe yield of tapped aquifers. The production capacity of proposed wells may normally be expected to approximate the capacity of existing wells in the same community.

In general, due to the unconfined nature of the aquifers which exist in the central valley, several wells may be found drawing water from the same aquifer. Where two or more of these wells are utilized in the development of a local water supply, their grouping is an important factor in securing the best results. Ideally, a large number of wells which tap the same aquifer should be located in a straight line across the flow of the groundwater stream, so that a constant and equivalent supply of water will be available from each well. If the wells are located in sequence downstream from one another, the flow per well will diminish in the downstream wells in proportion to the distance downstream from the primary well. Some interference between wells is permissible, as more piping and consequent friction losses would be required if they were placed sufficiently far apart to avoid all interference.

In addition to the hydraulic considerations, the legal complications resulting from the drilling of a well out of the municipal or district boundaries must be taken into consideration as well as the feasibility, in terms of cost, of transporting the water from a point which is a substantial distance from the services.

When a well is drilled, valuable information is furnished by a log of the material encountered in the sinking of a well. This log should be carefully preserved and made a matter of public record. In order to properly plan for future use of groundwaters, it is imperative that the depth, location, diameter and yields of wells within the basin be known. Such documentation should also include information on the quality of that well water at the time the well is first pumped. The log should include a description of the materials encountered, their depth and the water bearing characteristics of each stratum. The size of the well casing and the location of casing perforations are determined from the study of the information provided by the well log. Information from such well logs should be reviewed, checked for accuracy, tabulated in useable form and made available for planning use.

All water intakes or treatment works and wells, except those used for individual, single family domestic purposes, should be equipped with an accurately calibrated and properly located master water meter which is read periodically.

Surface Water Supply

In some areas of the county it is anticipated that an imported water supply will be necessary to meet future demands. For these areas transmission facilities will be required to convey the raw water supply from its source to the point of treatment prior to discharge to the user. The utilization of existing canals is anticipated to provide the predominant method of transport for the raw water.

If direct use of surface water is to be considered, a minimum of filtration and chlorination will be required, since the supply will generally be of high quality. Consideration should be given to the addition of chemicals where required, to produce a potable water supply of acceptable quality.

This utilization of chemicals will depend on the characteristics and source of the water prior to distribution. Capacity of treatment facilities will be based on average daily demands, taking into account maximum hour demands.

Water Distribution Systems

In the design of the distribution systems, the primary emphasis was placed on the adequacy of supply mains and the looping of main arteries in order to maintain constant flow and pressure throughout the system. In the design of supply mains, six inch pipe was considered to be minimum with four inch pipe considered minimum for main laterals.

The delivery of fire flow was taken into consideration in the design and placement of main lines with six inch lines being considered the minimum size which is satisfactory for hydrant supply in high value areas. Four inch pipes were considered for supplying hydrants only if six inch or larger mains were connected to the pipe.

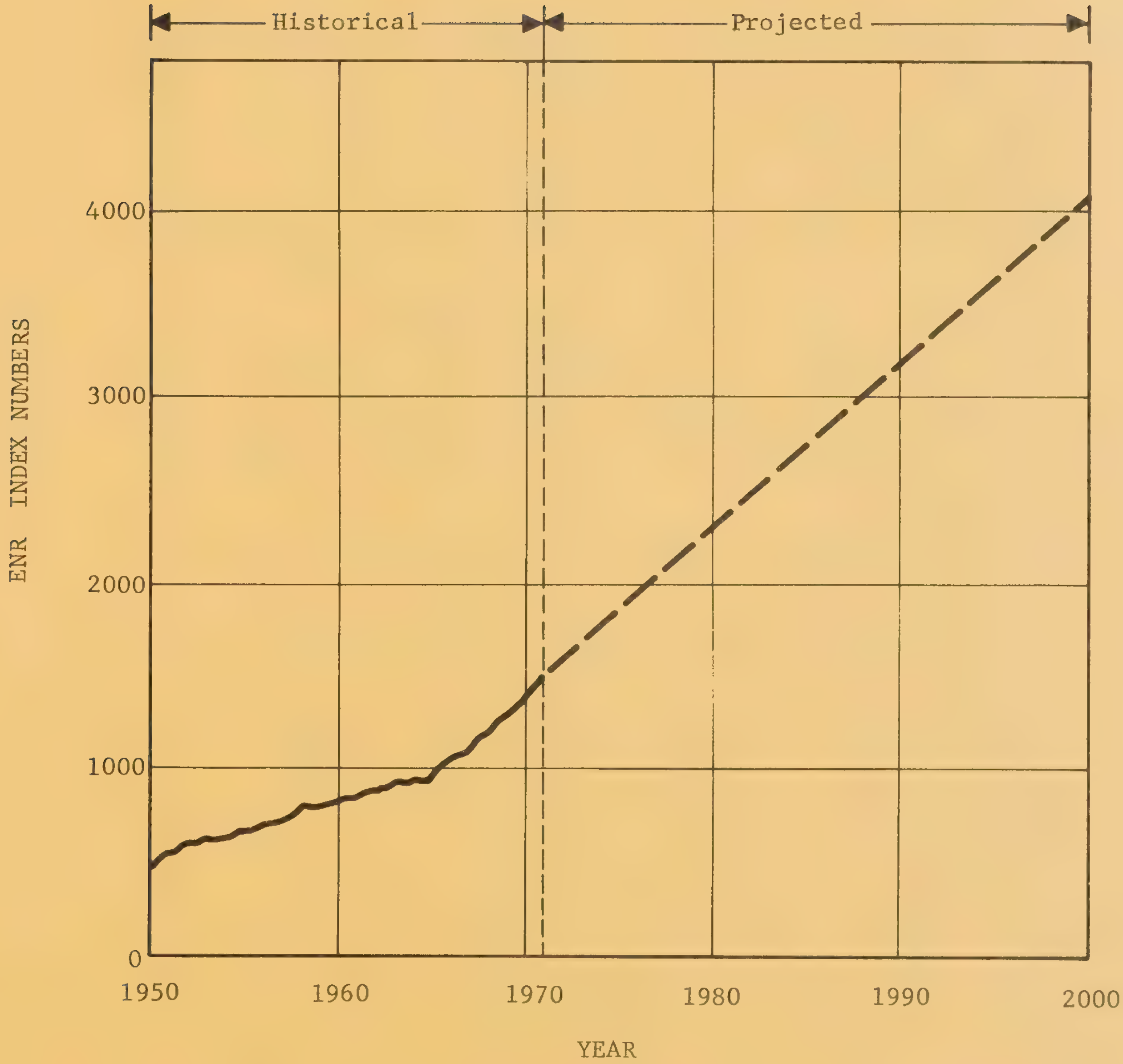
Emergency Water Supply

A very important consideration in the design of water supply systems is the maintaining of service during periods of power outage. Tulare County standards (Reference VI-2) require that maximum day demands be met during this period. Most power outages in Tulare County can be rectified within a four hour period, however, if a fire were to occur during this time in most of the smaller communities, the supply available from elevated storage, where existing, would be depleted within 30 minutes. Such a system, then could not serve either the municipal or fire flow needs. A comparative cost analysis indicated that it is more economical to provide standby power generating equipment on existing water supply sources than it is to provide elevated storage in amounts sufficient to meet average day requirements. In providing standby power to a new well or an existing site the following factors should be taken into

consideration: (1) the capacity of the well; (2) the cost of the generating unit; and (3) the probability of noise pollution. Where available, multiple circuits provide the most economical solution to the emergency supply situation, except where catastrophic conditions develop.

Fig. V-ll-2

Engineering News Record
Construction Cost Index



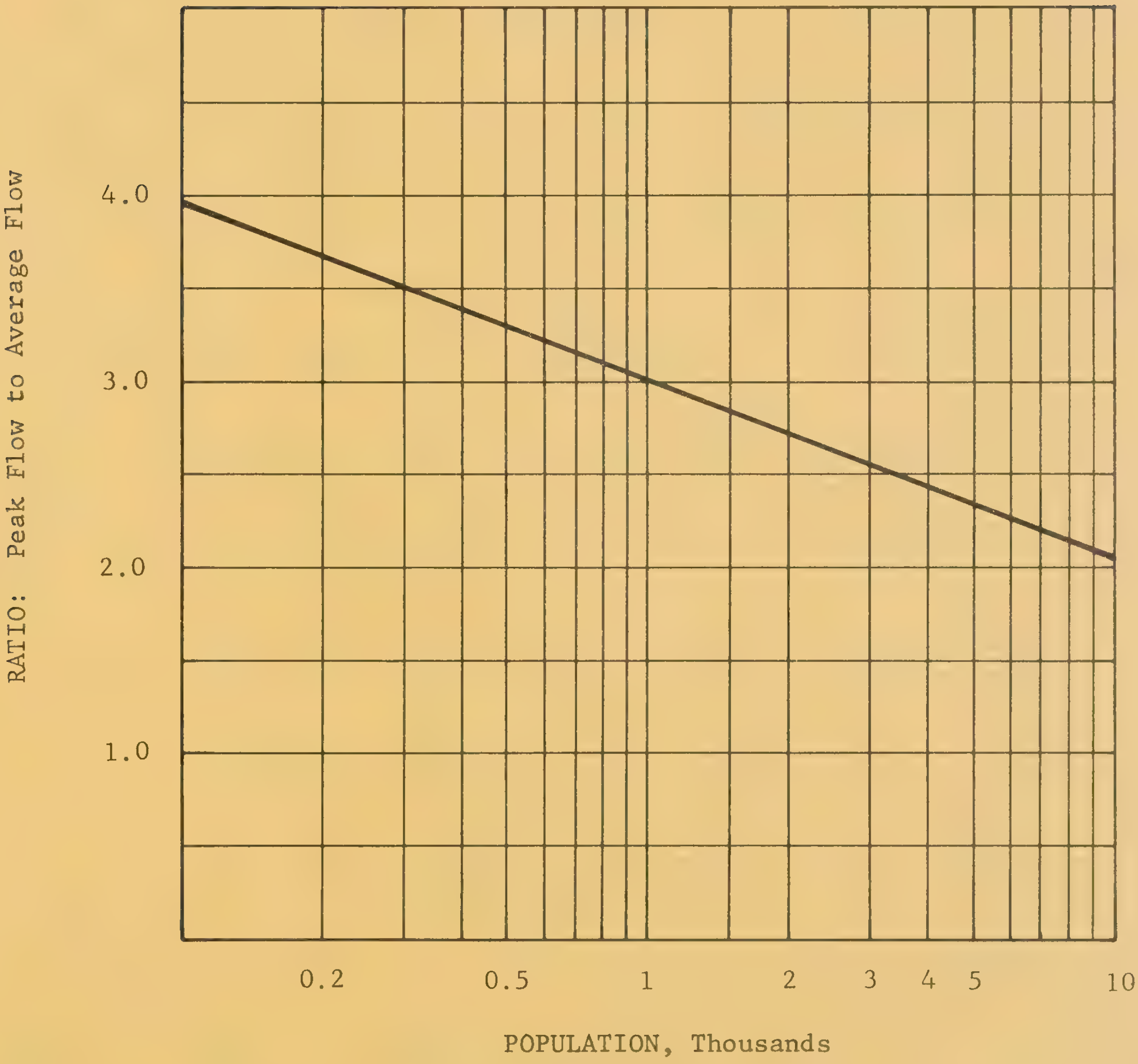
Basis: ENR Index 1913=100

Source: Engineering - Science, Inc.

Fig. V-ll-1

Peak Flow Factor

(Comparison of peak daily wastewater quantities to average daily wastewater quantities in relation to population size)



Source: Engineering - Science, Inc.

WASTEWATER FACILITIES DESIGN CONSIDERATIONS

Design Flow Basis and Pipeline Sizing Parameters

All wastewater flows indicated in Chapters V and VI represent average daily flow. Peak flows were determined utilizing the relationship between tributary population and probably peak factor shown on Figure V-1. Interceptors were sized to convey peak flows at 3/4 depth of flow utilizing Manning's equation with n = 0.013*. In most instances, reasonably accurate slopes were calculated from elevations indicated on construction drawings and United States Geological Survey topographic maps. When specific information was not available regarding probable pipeline slopes, major elements of proposed systems were sized according to the general parameters presented in Table VII-1.

TABLE VII-3

PIPELINE SIZING PARAMETERS

Tributary Population	Peak Factor (1)	Peak Flow per Acre (2) (gpm)	Pipe Size (inches)	Pipe (3) Capacity (gpm)	Service Area (acres)
800	3.1	3.23	6	174	54
1,600	2.8	2.92	8	312	107
2,700	2.6	2.71	10	486	179
4,200	2.4	2.50	12	702	281
7,200	2.2	2.29	15	1,097	479
11,400	2.0	2.08	18	1,583	761

(1) From Figure VII-1.

(2) Based on average flow of 100 gcd and development density of 15 persons per acre.

(3) Based on 3/4 depth of flow at minimum slope to maintain velocity of 2.0 fps, as determined by Manning's equations with n = 0.013.

---

* See "Glossary of Definitions" in Appendix.

Table VII-1 provides a correlation between population, pipe size, and service area based on a uniform density of development of 15 persons per acre. Because of the variable nature of the assumed conditions, the pipeline sizing basis presented in Table VII-1 should be employed with a degree of good engineering judgement.

Design Criteria for Pump Stations and Force Mains

Pumping stations should normally be constructed with at least two pumping units, each capable of handling flows somewhat in excess of the expected maximum flow. Where three or more pumps are necessary, a selection is made of pumping units having a total capacity such that with any one pump out of service, the remaining units will have the necessary capacity to accommodate maximum flows. Due to the likelihood of power failures, standby generators should also be considered in all cases.

Where necessary, pumping stations should include air compressor units which would inject air into the discharge piping in order to minimize the production of sulfides within the force mains.

From the aesthetic point of view, sites for the pumping stations should be chosen which result in minimal effects upon the neighboring area. Where desirable, consideration should be given to the use of underground installations; if not feasible, above ground installation should be provided with attractive security fencing and landscape screening.

Force mains from pumping stations should be sized to minimize pumping and maintenance costs. Velocities in force mains normally vary from a minimum of 2 fps (to control deposition and sulfide generation) to a maximum of 7 fps (to avoid corrosion and excessive energy losses) for the range of flows anticipated.

Wastewater Treatment Facilities

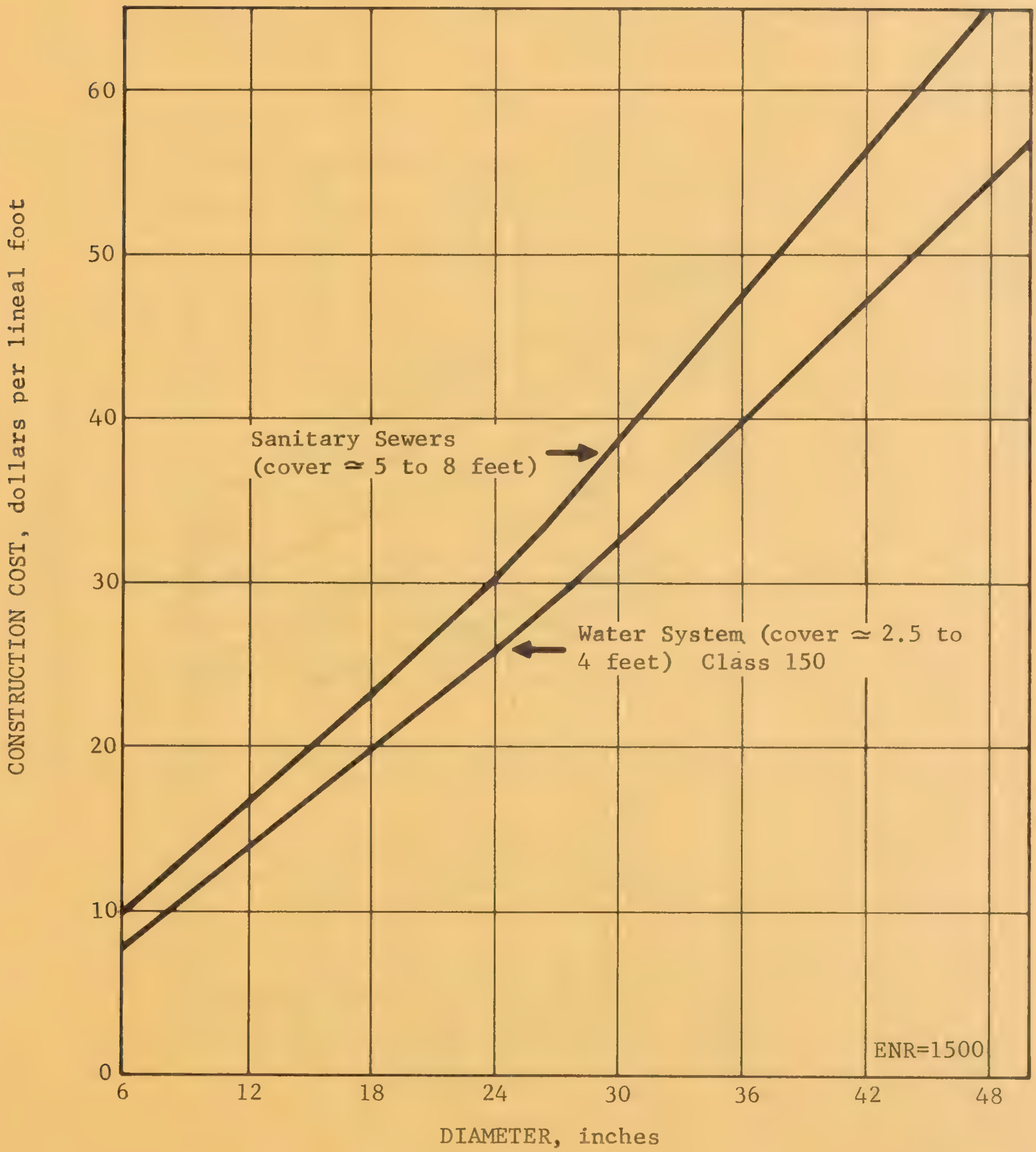
Wastewater treatment facilities have been recommended in Chapter VIII which are expected to conform to the established discharge requirements and which afford maximum potential for reclamation. If future discharge requirements place a greater emphasis on total dissolved salts, it is possible that more sophisticated methods of treatment may be required. Nevertheless, the treatment methods considered in this study may be described as follows:

1. Stabilization pond treatment - processing in a type of oxidation pond in which biological oxidation of organic matter is effected by natural or artificially accelerated transfer of oxygen to the water from air.
2. Primary treatment - a treatment process designed to remove from the sewage a high percentage of suspended matter but little or no colloidal and dissolved matter.
3. Secondary treatment - the treatment of wastewater by biological methods after primary treatment by sedimentation. To some extent secondary treatment is achieved in oxidation and facultative ponds; however, for purposes of this study, secondary treatment shall be considered to imply one or the other of the following.
   a. Biological filtration treatment (biofiltration) - the process of passing a liquid through the medium of a biological filter, thus permitting contact with attached zoogleal films that absorb and adsorb fine suspended, colloidal, and dissolved solids and release end products of biochemical action.
   b. Activated sludge treatment - a biological wastewater treatment process in which a mixture of wastewater and activated sludge

is agitated and aerated. The activated sludge is subsequently separated from the treated wastewater (mixed liquor) by sedimentation and wasted or returned to the process as needed.

Fig. V-II-3

Estimated Construction Cost of Pipelines

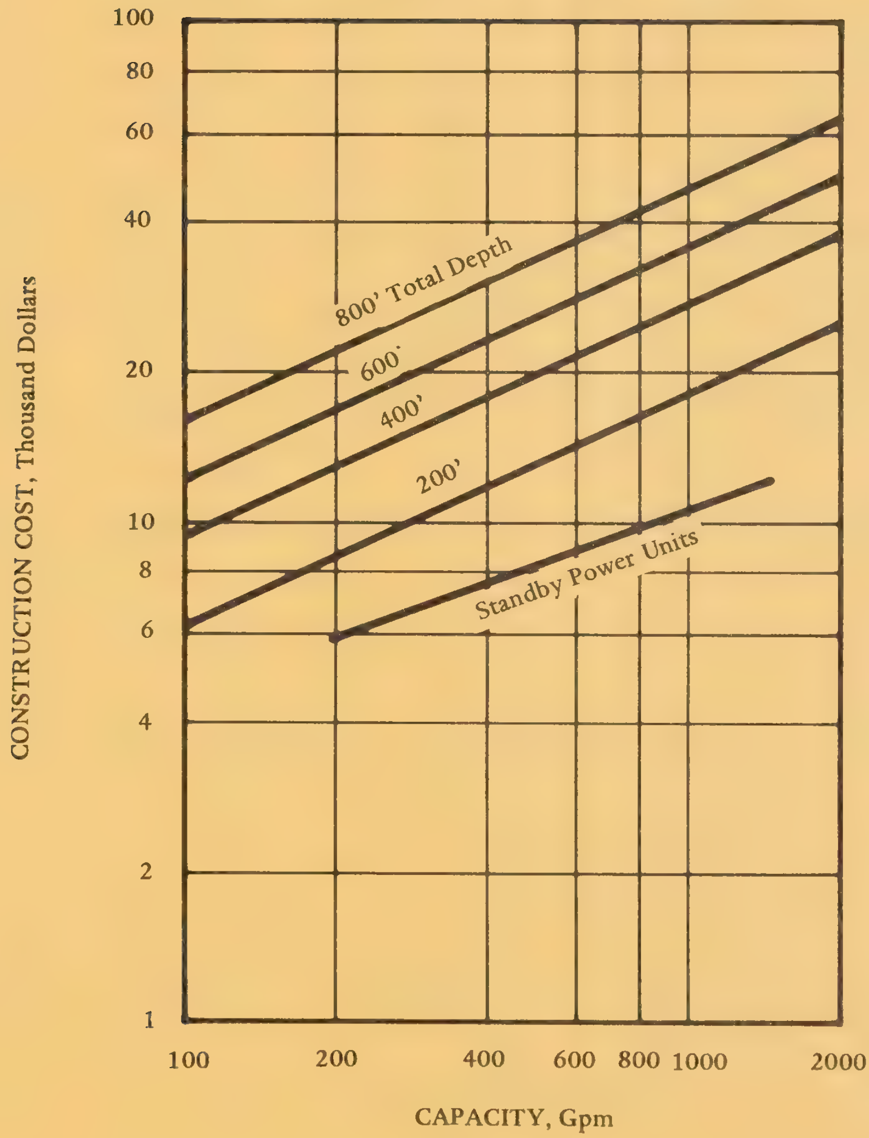


Note: Costs include pipe and appurtenant structures, installation and inspection, surface replacement, and contractor's overhead and profit. Costs are based on pipe laid in a dry trench and do not include allowance for construction contingencies, engineering or right-of-way acquisition.

Source: Engineering - Science, Inc.

Fig. V-ll-4

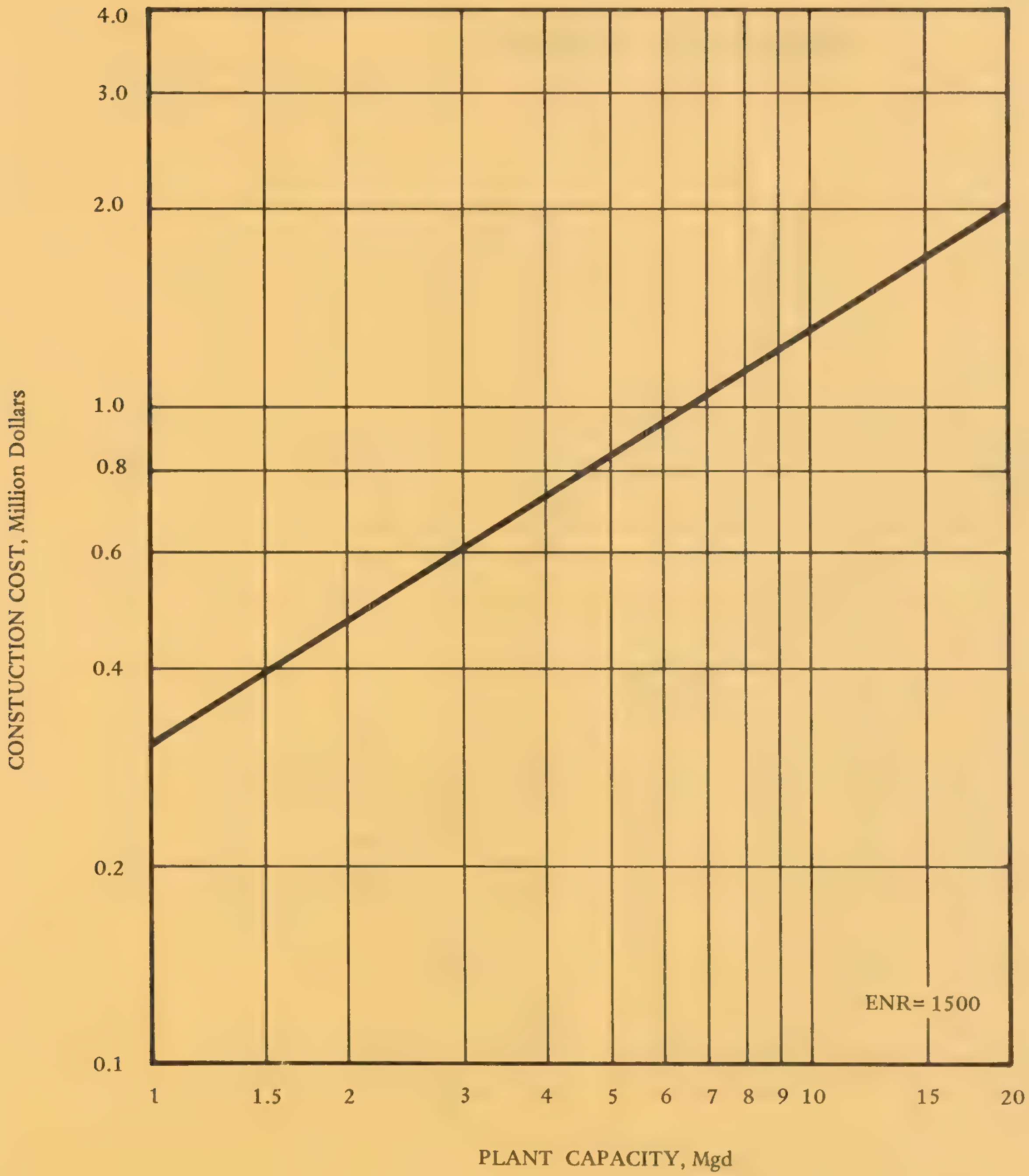
ESTIMATED CONSTRUCTION COST of WATER SUPPLY WELLS



Note: Costs include complete installation of well, pump, and controls including hydro-pneumatic storage tank. Costs do not include engineering and contingencies or cost of land.

Fig. V-II-5

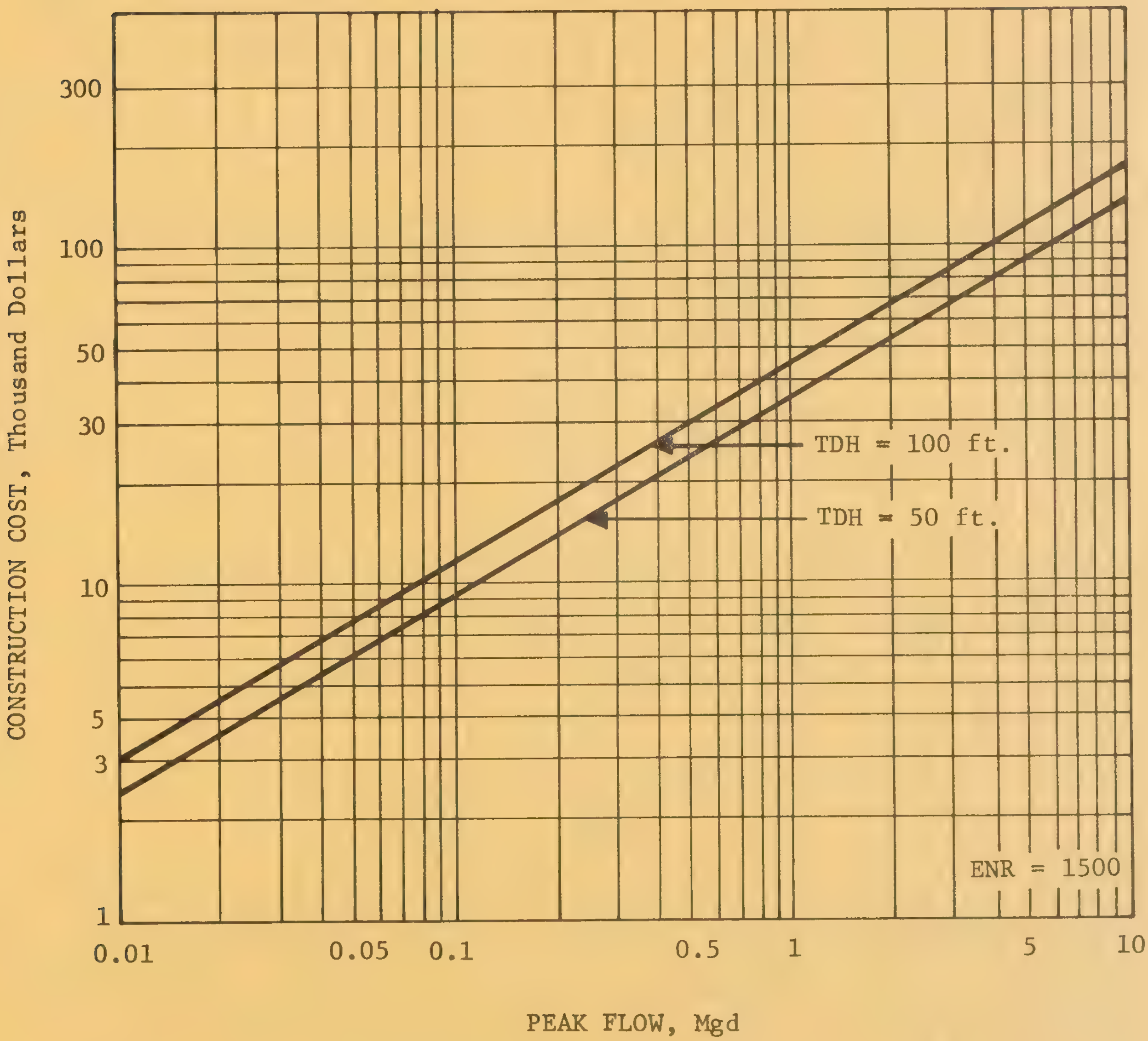
ESTIMATED CONSTRUCTION COST of WATER TREATMENT FACILITIES



Note: Costs include materials, installation, and inspection, and contractors overhead and profit for treatment plants providing filtration and chlorination. Costs do not include engineering and contingencies, nor do they include cost of land or special foundation work.

Fig. V-11-6

Estimated Construction Cost of Pump Stations



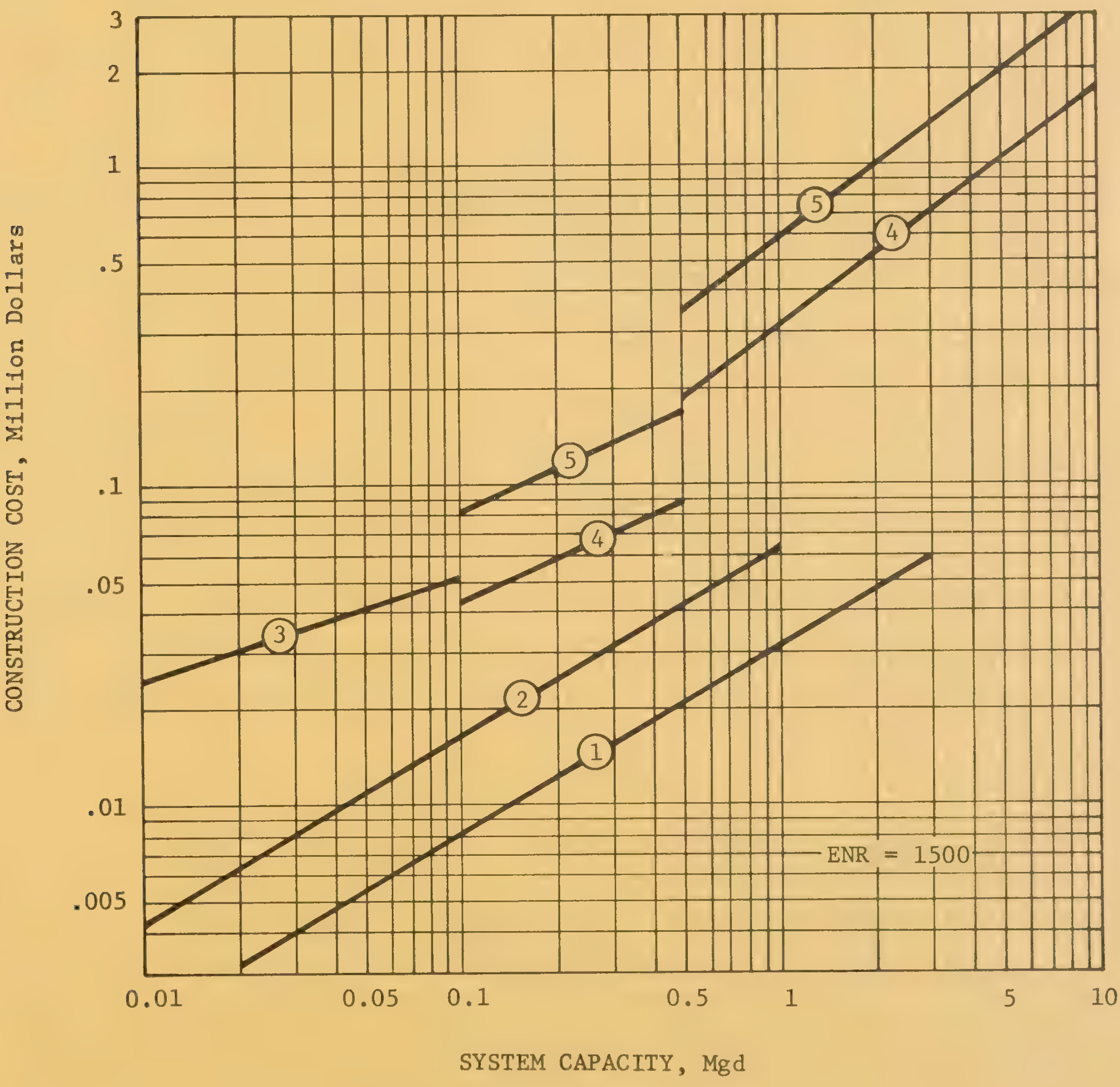
Note: The basic structure should be selected for the ultimate peak flow. Enlargement costs should then provide only for additional pumping units and valving necessary to achieve the desired incremental increase in capacity. Costs include materials, installation and inspection, and contractors overhead and profit. Costs do not include engineering and contingencies or cost of land.

Source: Engineering - Science, Inc.

Fig. V-ll-7

Estimated Construction Cost of Wastewater Treatment and Disposal Facilities

(1) Mechanical Aerators
(2) Stabilization Ponds (land included)
(3) Package Secondary Treatment Plant (including sludge holding tank)
(4) Primary Treatment System (including sludge digestion and disposal)
(5) Secondary Treatment System (including sludge digestion and disposal)



Note: Costs include complete installation of treatment facilities including electrical work and site piping. Costs do not include engineering and contingencies or cost of land (except as noted). Costs assume treatment of normal domestic wastewaters.

Source: Engineering - Science, Inc.

CAPITAL COST ESTIMATING BASIS

The capital cost of any project represents the total expenditure which must be made to construct the project including the cost of land acquisition construction costs, engineering services, legal fees, and contingencies.

Construction Cost Indices

Construction costs have been rising in the United States for many years, and it is anticipated that this trend will continue approximately as indicated by the projected ENR (Engineering News Record) Construction Cost Index shown on Figure VII-2. All cost estimates presented in this report were determined on the basis of 1971 prices corresponding to an ENR Index of 1,500. Therefore, estimates for all projects to be constructed in the future should be adjusted (utilizing the projected ENR Index) to reflect the actual funding required.

Unit Construction Costs

Estimated unit construction costs are presented on Figures VII-3 through VII-7 for the various project elements considered in the recommended systems. Although these cost data were based upon independent evaluations of construction costs experienced in the planning area, they compare favorably with unit costs presented in similar reports.

Cost of Land Acquisition

Construction of trunk sewers and major water distribution system improvements will generally not require significant purchases of privately owned land. Pipeline routes should be aligned where practicable to follow public streets and roads. For this reason, no attempt was made to estimate the cost of land purchases in connection with pipeline construction.

Land requirements for wastewater treatment and disposal facilities and for water supply wells, however, are more considerable. Land required for treatment and disposal facilities was estimated at $2,000 per acre and land required for water supply wells at $5,000 per acre.

Engineering Costs and Related Expenses

Engineering compensation for design and preparation of construction drawings, specifications, and related documents has been applied as a percentage of total construction cost, and varies with the volume of construction in a reciprocal relationship. The percentages used for the facilities included herein are in the range of 7 to 12 percent of construction costs and are commensurate with those most commonly used and outlined in the American Society of Civil Engineers Manual No. 45 (Reference VII-2). A cost allowance for contingencies to cover all unpredictable items of construction has similarly been added as a percentage of construction costs and is included at 10 percent.

Legal and administrative expenses usually fall between two and three percent, and the cost of financial advice, printing of bonds, discount of bonds, etc., between one and five percent. To estimate the combined costs of these items, a total of five percent of the construction costs has been used.

The estimated costs for engineering and contingencies, legal, administrative, and financial expenses will thus vary between 22 and 27 percent of construction costs; in all the cost estimates shown 25 percent has been included.

CHAPTER EIGHT

RECOMMENDED WATER SUPPLY AND WASTE-WATER MANAGEMENT PLANS

CHAPTER VIII

RECOMMENDED WATER SUPPLY AND WASTEWATER MANAGEMENT PLANS

INTRODUCTION

The primary objective of this chapter is to describe and delineate the recommended water supply and wastewater management plans for communities and cities within the planning area. These plans are designed to serve the various communities in a manner which is in keeping with current social, physical and economic conditions, as well as for the future design period which extends to the year 1990.

A county-wide plan for water supply is presented which includes consideration of probable future water supply sources, water production requirements, and system recommendations. The wastewater management plan describes recommended wastewater facilities and considers potentials for regionalization, pretreatment of industrial wastewaters, and feasible means for disposing of non-reclaimable wastewaters. Costs for recommended facilities are presented in tabular form at the end of the sections describing the recommended systems and facilities.

TULARE COUNTY WATER SUPPLY PLAN

General

It is expected that most valley-floor cities, districts and communities will continue to obtain water supplies from groundwater sources. Supplies to meet the needs of some entities close to the foothills, such as the cities of Woodlake and Lindsay, will come from a combination of groundwater and imported supplemental surface water. These assumptions are based on the maintenance of the quality of the groundwater above the minimum standards established by public health authorities. In order to meet these standards, wastewater treat-

ment, in the manner and levels recommended in this report, must be carried out.

To maintain groundwater of proper quality and at feasible pumping depths, additional supplemental surface water supplies must be imported into Tulare County. Through management and cooperative use of surface and groundwaters, it is possible to use the large groundwater supplies underlying Tulare County without appreciable depletion of the storage pool. Implementation of practical water use policies will require coordination and cooperation by all water-user entities. Such conjunctive use of water by agricultural interests will result in reduction of groundwater pumping when sufficient surface water is available so that groundwater will be available in time of need for withdrawal for all purposes. This availability will meet domestic and municipal needs and will eliminate the need for conveying, treating, and storing surface water. Dependable groundwater supplies will have the capability of meeting agricultural demands which vary with surface water availability.

Sources of Surface Water

Local surface supplies are mainly derived from the Kaweah, Tule, and Kings Rivers. These supplies have been distributed within well-defined service areas for many years under established water rights. The other streams in Tulare County do not provide dependable surface water.

The Friant-Kern Canal of the Central Valley Project conveys water from the San Joaquin River to specific service areas in Tulare County. No additional water is available for other service areas or needs in the county from the Friant-Kern Canal.

The proposed East Side Division of the Central Valley Project is under consideration. The plan for this Division envisages the conveyance of water from the Sacramento area to service areas along the east side of the San

Joaquin Valley. Authorization and construction of this facility is a necessity if present and future water deficiencies are to be overcome. No other proposal appears to have long-range economic or political feasibility. Interim arrangements for the interconnection and exchange of water supplies through federal, state, and local facilities are under investigation.

One of the most likely possibilities would be through deliveries of water from the California Aqueduct to lower Kings River diverters. Equivalent flows, less transmission losses, would then be available, by exchange, to upstream Kings River diverters. Additional water might be transferred into Friant-Kern Canal through the medium of similar Kings River exchanges.

Another alternative would be the arrangement transferring state or federal water in the California Aqueduct, via the proposed cross-valley canal, for use in the lower reaches of the Friant-Kern Canal. Equivalent water could then be released for use in upper service areas of the canal.

Individual Systems on Valley Floor

With adequate groundwater supplies of good quality, it appears that most cities, communities, and districts on the valley floor can more feasibly and economically be served with wells and pumps located within their respective boundaries than by surface water sources. However, surface supplies will be needed to supplement groundwater supplies in some localities. In designated areas, connections between separate water systems are recommended for such reasons as emergency aid for domestic service and fire protection.

Individual Systems in Mountains and Foothills

Entities away from the valley floor not located on major streams generally do not have groundwater aquifers or supplies sufficient to meet additional future needs. Until adequate surface water can be made available by direct delivery

or by exchange, growth of many of the mountain or foothill communities will be severely restricted. Exchanges can be effected in some of these areas where surface flows, now flowing to the valley floor to meet prior rights, can be replaced on the valley floor with imported water. The upper user would purchase imported water for delivery to the valley floor water right holder so that an amount of water equal to the import delivery less transmission losses could then be diverted by the upper user. Such exchanges depend on provision of surface supplies by East Side Division canals or previously discussed alternative surface water diversions from the Friant-Kern Canal or the California Aqueduct.

Projected Water Production Requirements

Two conditions have been evaluated in determining future required production. The first condition involves a comparison of total available production from wells, treatment facilities and elevated storage (from Chapter IV) with the projected maximum day (water supply necessary to provide for daily peak period demands) plus fire flow requirements.(1) For comparative purposes, the quantities available from elevated storage were distributed over the required fire flow duration time. From this comparison, the additional production required to supply maximum day plus fire flow requirements was determined.

The second condition involves a comparison of production available during a power outage with the projected maximum day demands. Supplies available from elevated storage were distributed over a four hour period, as experience has shown that the maximum anticipated power outage in Tulare County normally does not exceed this length of time. The required additional emergency production could be supplied by either additional elevated storage, wells with

(1) Fire flow requirements = Standards of supply set by the National Board of Fire Underwriters by which insurance rates are determined. Such standards are expressed in terms of gallons per minute passing the nozzle of the fire hose for specified amounts of time, as well as pressure in pounds per square inch (psi) at the fire hydrant.

standby power, treatment facilities with standby power, or wells which utilize separate electrical circuits, or combinations of these alternatives. The requirements are presented in Tables VIII-1 and VIII-2.

Water Supply Systems Recommendations

The objective of this section is to recommend water supply systems which will provide the optimum supply for projected water demands. Proposed well locations and main distribution facilities are shown on the water system plates at the end of the chapter. Main distribution facilities consist of those water mains required to transport water to primary areas of consumption.

There are several communities which do not have an existing water system and for which the construction of a community system is not anticipated. Several factors have led to the recommendation that community water service not be provided to these small service centers. The foremost consideration was the estimated future population of the individual communities. Significant declines in population are projected in many of these communities and this fact, when considered in light of the present and projected economic conditions in these localities, presents a serious obstacle to the provision of community water service to these communities. Several communities are characterized by a low density housing pattern which also hinders the development of a community water system due to the high cost of construction.

Consideration of the availability of financial assistance from federal and state funds would show many of these communities are not able to completely fund the construction of water supply facilities even with massive outside help. If such systems could be built, it is doubtful that local funding would be available to adequately maintain the system. It is therefore the recommendation of this report that central water supply facilities not be provided

for the communities of Elderwood, Lindcove, Monson, Waukena, and Yettem unless presently unforeseen growth takes place.

TABLE VIII-1

PRODUCTION CAPACITY REQUIREMENTS - 1980
TULARE COUNTY

City, Community or Tract	FIRE FLOW CONDITION			POWER OUTAGE CONDITION		
	Maximum Day + Fire Flow(1) (gpm)	Total Available Production(2) (gpm)	Required Production(3) (gpm)	Maximum Day(1) (gpm)	Available Production(4) (gpm)	Required Production(5) (gpm)
Sub-Planning Area A						
Cutler-Orosi	5,685	4,178	1,507	3,025	802 (c)	2,223
Delft Colony	733	-	733	93	-	93
East Orosi	514	250	264	14	-	14
London	997	420	577	97	-	97
Monson	514	-	514	14	-	14
Seville	624	140	484	69	-	69
Sultana	557	-	557	57	-	57
Traver	733	1,000	-	93	-	93
Yettem	680	-	680	80	-	80
Sub-Planning Area B						
Elderwood	592	-	592	62	-	62
Exeter	4,440	4,056	384	1,920	417 (c)	1,503
Farmersville	3,570	2,500	1,070	1,250	-	1,250
Goshen	1,713	860	853	343	500	-
Ivanhoe	1,530	1,311	219	270	-	270
Lemon Cove	546	120	426	46	-	46
Lindcove	532	-	532	32	-	32
Linnell Farm Center	971	477	494	151	145 (c)	6
Patterson Tract	1,027	750	277	167	-	167
Oak Ranch	542	710	-	42	-	42
Tooleville	530	-	530	30	-	30
Woodlake	4,130	3,053	1,077	1,750	2,080 (c)	-
Tract 92	645	875	-	75	-	75

TABLE VIII-1 (Continued)

PRODUCTION CAPACITY REQUIREMENTS - 1980
TULARE COUNTY

City, Community, or Tract	FIRE FLOW CONDITION Maximum Day + Fire Flow(1) (gpm)	FIRE FLOW CONDITION Total Available Production(2) (gpm)	FIRE FLOW CONDITION Required Production(3) (gpm)	POWER OUTAGE CONDITION Maximum Day(1) (gpm)	POWER OUTAGE CONDITION Available Production(4) (gpm)	POWER OUTAGE CONDITION Required Production(5) (gpm)
Sub-Planning Area C						
Waukena	530	-	530	30	-	30
Tract 51	532	-	532	32	-	32
Tract 104	(a)					
Sub-Planning Area D						
Lindsay	7,645	6,735	910	4,465	6,735	-
Plainview	1,123	820	303	193	-	193
Strathmore	1,350	1,795	-	410	1,270 (c)	-
Tonyville	150	(d)	-	34	(d)	-
Sub-Planning Area E						
Allensworth	541	600	-	41	-	41
Alpaugh	918	2,110	-	138	270 (c)	-
Earlimart	2,570	1,500	1,070	760	(e)	-
Pixley	1,622	2,967	-	242	208 (c)	34
Teviston	534	500	34	34	-	34
Tipton	1,328	1,754	-	308	104	204
Woodville	1,250	2,200	-	230	-	230
Woodville Farm Center	867	991	-	107	416 (c)	-

TABLE VIII-1 (Continued)

PRODUCTION CAPACITY REQUIREMENTS - 1980
TULARE COUNTY

City, Community, or Tract	FIRE FLOW CONDITION Maximum Day + Fire Flow(1) (gpm)	Total Available Production(2) (gpm)	Required Production(3) (gpm)	POWER OUTAGE CONDITION Maximum Day(1) (gpm)	Available Production(4) (gpm)	Required Production(5) (gpm)
Sub-Planning Area F						
Ducor	629	225	404	69	50 (c)	19
Poplar-Cotton Center	1,500	1,625	-	350	-	350
Richgrove	1,358	457	901	268	-	268
Terra Bella	1,312	1,000	312	252	-	252
Tract 213	630	350	280	70	-	70
Sub-Planning Area G						
Camp Nelson	1,500	2,495	-	344	2,320 (c)	-
Springville	1,700	1,850	-	472	500 (c)	-
Sub-Planning Area H						
Three Rivers (b)	1,896	2,004	-	466	(f)	(f)

(1) From Table VI-2.
(2) Total production available from wells, treatment facilities, and elevated storage; from Chapter IV.
(3) Additional production required to supply maximum day plus fire flow requirements.
(4) Production available from elevated storage and wells or treatment plants with standby power; from Chapter IV.
(5) Production required to be provided by either additional elevated storage, wells with standby power, or additional treatment units with standby power.

(a) Assumes incorporation into the City of Tulare.
(b) Includes Tract 107.
(c) Indicates systems with elevated storage.
(d) An adequate supply is available from the Lindsay-Strathmore Irrigation District to meet required flows.
(e) Four independent circuits are provided to meet emergency needs.
(f) Some production is available from elevated storage.

TABLE VIII-2

PRODUCTION CAPACITY REQUIREMENTS - 1990
TULARE COUNTY

City, Community or Tract	FIRE FLOW CONDITION			POWER OUTAGE CONDITION		
	Maximum Day + Fire Flow(1) (gpm)	Total Available Production(2) (gpm)	Required Production(3) (gpm)	Maximum Day(1) (gpm)	Available Production(4) (gpm)	Required Production(5) (gpm)
Sub-Planning Area A						
Cutler-Orosi	6,535	4,178	2,357	3,675	802 (c)	2,873
Delft Colony	684	-	684	84	-	84
East Orosi	505	250	255	5	-	5
London	1,002	420	582	102	-	102
Monson	505	-	505	5	-	5
Seville	560	140	420	60	-	60
Sultana	548	-	548	48	-	48
Traver	736	1,000	-	96	-	96
Yettem	684	-	684	84	-	84
Sub-Planning Area B						
Elderwood	632	-	632	72	-	72
Exeter	5,020	4,056	964	2,320	417 (c)	1,903
Farmersville	4,430	2,500	1,930	1,760	-	1,760
Goshen	2,014	860	1,154	464	500	-
Ivanhoe	1,386	1,311	75	236	-	236
Lemon Cove	632	120	512	72	-	72
Lindcove	524	-	524	24	-	24
Linnell Farm Center	980	477	503	159	145 (c)	14
Patterson Tract	1,019	750	269	169	-	169
Oak Ranch	543	710	-	43	-	43
Tooleville	510	-	510	10	-	10
Woodlake	5,440	2,963	2,477	2,600	2,080	520
Tract 92	632	875	-	72	-	72

TABLE VIII-2 (Continued)

PRODUCTION CAPACITY REQUIREMENTS - 1990
TULARE COUNTY

City, Community, or Tract	FIRE FLOW CONDITION			POWER OUTAGE CONDITION		
	Maximum Day + Fire Flow(1) (gpm)	Total Available Production(2) (gpm)	Required Production(3) (gpm)	Maximum Day(1) (gpm)	Available Production(4) (gpm)	Required Production(5) (gpm)
Sub-Planning Area C						
Waukena	524	-	524	24	-	24
Tract 51	524	-	524	24	-	24
Tract 104	(a)	-	-	-	-	-
Sub-Planning Area D						
Lindsay	9,590	6,735	2,855	6,020	6,735	-
Plainview	1,051	820	231	181	-	181
Strathmore	1,710	1,795	-	480	1,270 (c)	-
Tonyville	512	(d)	-	12	(d)	-
Sub-Planning Area E						
Allensworth	531	600	-	31	-	31
Alpaugh	726	2,110	-	96	270 (c)	-
Earlimart	2,710	1,500	1,210	840	(e)	-
Pixley	1,732	2,967	-	282	208 (c)	74
Teviston	512	500	12	12	-	12
Tipton	1,377	1,754	-	347	104	243
Woodville	1,241	2,200	-	241	-	241
Woodville Farm Center	873	991	-	113	416 (c)	-

TABLE VIII-2 (Continued)

PRODUCTION CAPACITY REQUIREMENTS - 1990
TULARE COUNTY

City, Community, or Tract	FIRE FLOW CONDITION: Maximum Day + Fire Flow(1) (gpm)	FIRE FLOW CONDITION: Total Available Production(2) (gpm)	FIRE FLOW CONDITION: Required Production(3) (gpm)	POWER OUTAGE CONDITION: Maximum Day(1) (gpm)	POWER OUTAGE CONDITION: Available Production(4) (gpm)	POWER OUTAGE CONDITION: Required Production(5) (gpm)
Sub-Planning Area F						
Ducor	672	225	447	82	50 (c)	32
Poplar-Cotton Center	1,212	1,625	-	252	-	252
Richgrove	1,464	457	1,007	314	-	314
Terra Bella	1,389	1,000	389	289	-	289
Tract 213	632	350	282	72	-	72
Sub-Planning Area G						
Camp Nelson	1,847	2,495	67	457	2,320 (c)	-
Springville	1,944	1,850	94	554	500 (c)	-
Sub-Planning Area H						
Three Rivers (b)	2,964	2,004	960	964	(f)	(f)

(1) From Table VI-2.
(2) Total production available from wells, treatment facilities, and elevated storage; from Chapter IV.
(3) Additional production required to supply maximum day plus fire flow requirements.
(4) Production available from elevated storage and wells or treatment plants with standby power; from Chapter IV.
(5) Production required to be provided by either additional elevated storage, wells with standby power, or additional treatment units with standby power.

(a) Assumes incorporation into the City of Tulare.
(b) Includes Tract 107.
(c) Indicates systems with elevated storage.
(d) An adequate supply is available from the Lindsay-Strathmore Irrigation District to meet required flows.
(e) Four independent circuits are provided to meet emergency needs.
(f) Some production is available from elevated storage.

SUB-PLANNING AREA A

Cutler-Orosi

Projected water demands suggest that it will be necessary to provide an additional 1,500 gallons per minute capacity to a combined Cutler-Orosi water system to meet the 1980 maximum day plus fire flow demands and an additional 850 gallons per minute capacity to meet 1990 demands. The recommendation to combine the two systems is the result of the consideration of the advantages and disadvantages of alternative systems. Advantages associated with the combining of the systems include (1) more efficient water supply for meeting fire flow demands, (2) the distribution of a more reliable and balanced supply to the service area, and (3) reduced costs associated with the operation and maintenance of the single supply system. Based on the capacity of existing wells, it is anticipated that the installation of three additional new wells will be required, each with standby power, to meet 1980 demands. The installation of two additional new wells, one with standby power, to meet 1990 demands is anticipated. Existing wells which go out of service due to deterioration or other causes are not included in these estimates and would have to be considered as additional necessary replacements.

Delft Colony

Several shallow water wells currently serve the residents of this community. In addition, septic tanks and leach fields are currently utilized for sewage treatment and disposal and it is anticipated that this practice will continue. The relatively high density of development, when coupled with the use of leach lines for sewage effluent disposal, provides a basis for recommending that a community water system be implemented at the earliest possible date. It is anticipated that two wells will be required, one with standby power, to meet future demands.

East Orosi

An additional well should be constructed to provide adequate fire protection to the residents of East Orosi. The existing wells do not provide an adequate supply of water to meet the minimum Tulare County standards for fire flow and they just meet the minimum required by the Pacific Fire Rating Bureau. In addition, water lines should be constructed as shown on the water system plate for East Orosi so that a sound grid system will be established for the delivery of uniform water flow and pressures to all parts of the system.

London

The three existing wells which serve the London Community Services District are not of sufficient capacity to provide the 1980 maximum day plus fire flow demands. Based on projected flow demands, an additional 580 gallons per minute will be required, and indications are that two wells will be required to supply this demand. At least one of these new wells should be connected to standby power. The existing supply is not adequate to meet existing minimum fire flow requirements and thus effort should be made to construct these facilities as soon as possible.

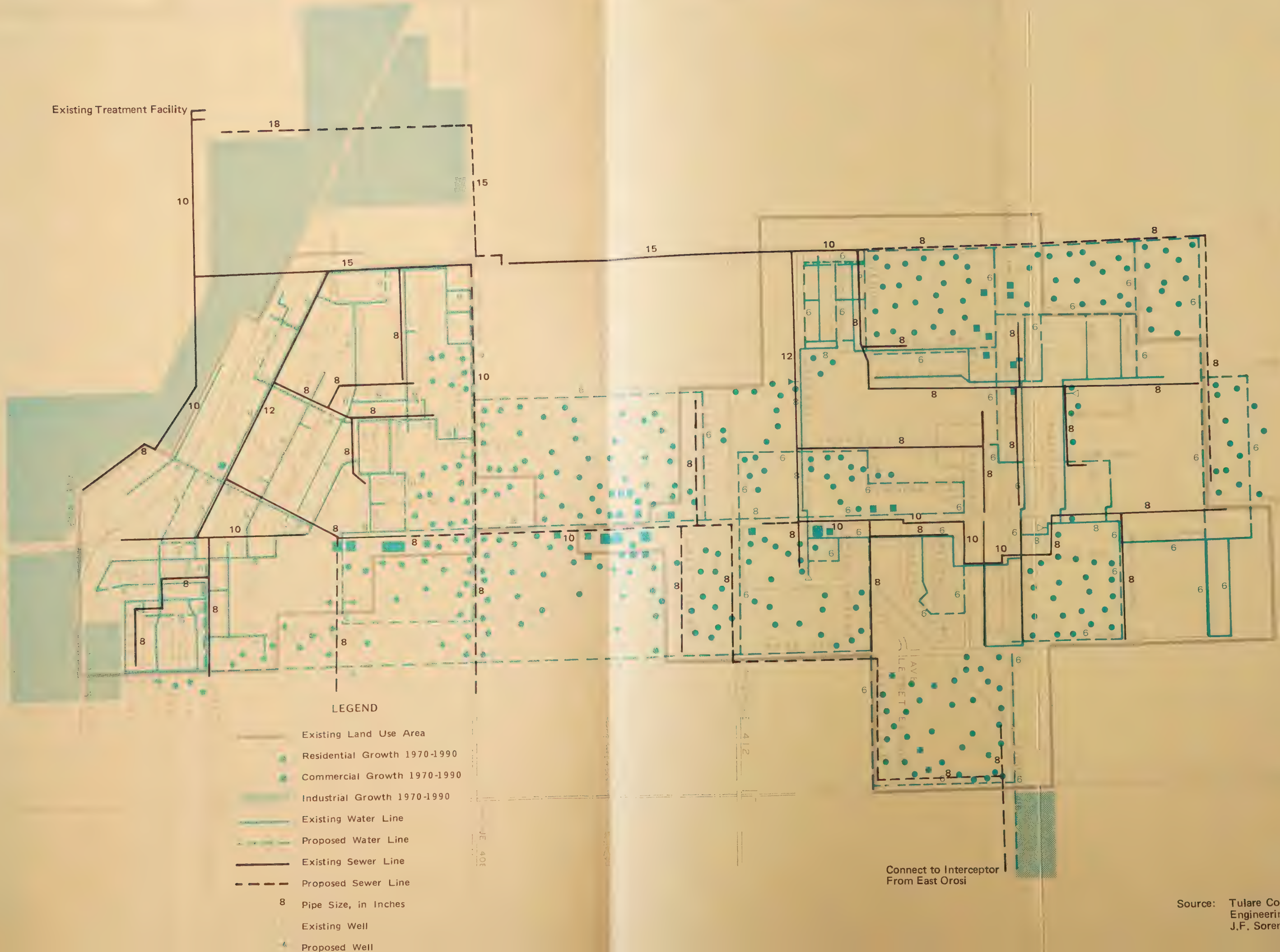
Seville

The existing water system which serves the community of Seville is owned by a private water company. Several improvements are recommended for the system in order to correct existing deficiencies. The existing water supply, even if the school well is taken into account, is not adequate to supply 1980 maximum day plus fire flow demands. An additional well of 480 gallons per minute capacity will be required to meet these demands if minimum standards of flow and pressure are to be maintained. Many of the existing laterals are not of sufficient size to provide an adequate flow of water at minimum

Plate 1

CUTLER - OROSI

PROJECTED LAND USE and SERVICES



Source: Tulare County Planning Department
Engineering - Science, Inc.
J.F. Sorenson

Plate 1-A

CUTLER - OROSI

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-2

EAST OROSI

EXISTING LAND USE and SERVICES

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Plate-3

LONDON

EXISTING LAND USE and SERVICES

LEGEND

- ● Residential
- ■ Commercial
- Existing Water Line
- Proposed Water Line
- Existing Sewer Line
- 8 Pipe Size, in Inches
- Existing Well
- ▲ Proposed Well
- Poor Housing Area

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

residual[1] pressures. It is therefore recommended that several existing lines be replaced with larger supply mains in order to provide adequate service to areas whose water is deficient either in pressure or rate of flow, or both.

Sultana

At the present time, the community of Sultana does not have a community water system. In order to provide a more adequate and dependable supply to this community, it is recommended that a central water system be developed and constructed. This recommendation is contrary to the projected population trend; however, a rationale for the recommendation of a community water system is the fact that several hundred people are anticipated to be living in Sultana in 1990. Two wells providing a total of 550 gallons per minute capacity should be developed with at least one well provided with an auxiliary power source. The recommended distribution system is as shown on the water system plate for Sultana at the end of this chapter.

Traver

When considering growth projections, the two wells of the Traver Community Service District system appear to have sufficient capacity to serve the community until 1990. Due to the fact that there is no standby power on the existing wells, it is recommended that one well be connected to standby power to provide emergency supply to the system due to power outage conditions. The construction of interconnecting lines should also be implemented at the earliest possible date to complete a grid system for the provision of water in uniform flows and pressures to all areas of the community.

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(1) Residual pressure = the pressure remaining in the mains of a water distribution system when a specified rate of flow, such as that needed for fire-fighting purposes, is withdrawn from the system.

SUB-PLANNING AREA B

Exeter

The City of Exeter is anticipating substantial growth in the next two decades. The expansion of existing industries there is expected, as well as the development of several new industries in Exeter. Additional water will be required to meet future demands and it is anticipated that groundwater supplies will continue to be utilized to meet the future demands. Based on the capacity of existing wells, it is predicted that the installation of one well will be required during each design period (1970-80 and 1980-90). The amount of water available during power outage conditions is less than the minimum required and steps should be taken to improve this condition. Correction could mean standby power or elevated storage but the final answer should be determined after more intensive study of system needs. The distribution system appears to be adequate at the present time; recommended future lines are shown on the water system plate.

Farmersville

According to growth projections, two wells of approximately 500 gallons per minute capacity will be required to meet the 1980 water demands with two more wells of approximately the same capacity required to meet the 1990 demands. Community development is projected for the north and northeastern portions of the community with the proposed lines designed to meet the needs of these areas. These lines should be implemented as community development requires. Figures presented in Tables VIII-1 and VIII-2 indicate that existing sources should produce at least 1,250 gallons per minute during times of power outage. At the present time no provision is made for supplying water during a power outage condition and this situation should be rectified by connection to standby power at the earliest possible date. At least 500 gallons per minute emergency pro-

duction will be required to meet 1990 emergency requirements in addition to the 1980 requirements.

Goshen

Projected growth patterns for the community of Goshen indicate that the growth will occur to the north and the east. Before water service is extended to this area, however, the deficiencies which exist in the present water supply system should be corrected. Several lines are recommended to establish a grid system which would provide a more adequate water supply at a reasonably constant pressure in all parts of the service area. Additional wells should be drilled and equipped with pumping equipment, as required, to meet future demands. Emergency standby power is provided on one well which meets projected minimum requirements, but improvements should be made upon minimum standards whenever possible.

Ivanhoe

Projected water demands indicate that it will be necessary to provide an additional 220 gallons per minute capacity to the system to meet the future maximum day plus fire flow requirements. The implementation of measures to make this recommendation a reality should take place at the earliest possible date despite population projections which indicate an overall decrease by 1980. It is also recommended that provision be made to supply water for fire flow purposes during power outage conditions due to the investment in processing equipment made by local packers. This investment should be protected as the packing sheds provide the major source of income for many local residents.

Lemon Cove

Several deficiencies exist in the water system of the Lemon Cove Water Company. The existing water distribution system is inadequate to serve the

existing population as is the water supply. It is therefore recommended that a new distribution grid be constructed similar to that presented on the water system plate for Lemon Cove and that a well, or a combination of wells if necessary, be developed to supply the required maximum day plus fire flow demands. This well should be provided with an auxiliary power source to provide service to the community during power outage conditions.

<u>Linnell Farm Center</u>

The existing water system which serves the Linnell Farm Labor Center does not meet minimum standards according to the Pacific Fire Rating Bureau. The existing well is set up to pump to elevated storage only, with the water in the storage tank then being distributed to the system. According to the well driller's information, the existing well could pump up to 400 gallons per minute if fully developed. However, due to the seriousness of the present deficiencies, it is recommended that a more detailed study of the existing system be made in the near future. It appears that some of the distribution pipe could be tuberculated[1] to the point of causing a cessation of flow in some areas. Some consideration should be given to the development of a well which would supply water directly to the system rather than to the elevated storage tank should a more in-depth study be undertaken.

<u>Patterson Tract</u>

The two existing wells which serve the Patterson Tract Community Service District are not of sufficient capacity to provide the 1980 maximum day plus fire flow requirements. Based on projected flow demands, an additional 280 gallons per minute will be required by 1980, and indications are that one well will be required to supply this demand. It is therefore recommended that one well be

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(1) Tuberculation = formation of small knobs or buttons of rust inside the pipe.

constructed in the near term to meet the projected needs and that it be supplied with an auxiliary power source to supply water during emergency periods.

Consideration should be given to combining the existing water supply with that of the California Water Company in Visalia to provide a more adequate source of water for the Patterson Tract and intermediate areas. The implementation of this project could take place during the 1980-90 design period depending on the rate of population expansion in the area.

Oak Ranch

If development occurs according to the projections for the Oak Ranch area, the existing water supply appears to have sufficient capacity to serve the community until 1990. Some looping of existing lines is recommended, however, to provide an adequate grid for supplying the individual users in a uniform way throughout the service area. It is also recommended that some source of auxiliary power be developed to provide service to the area during power outage conditions.

Tooleville

Due to the relative density of development in the area and in order to protect the residents from bacteriological contamination of their water supply resulting from the use of septic tanks and leaching systems which concentrate contaminants in local groundwater sources, it is recommended that a community water system be developed for this area. Recommended system elements are shown on the water system plate for Tooleville at the end of the chapter. It is anticipated that two wells will be required to supply the maximum day plus fire flow requirements with auxiliary power supplies to one well to meet demands during power outage conditions. It is recommended that this community water system be installed at the earliest possible date in order to reduce the possibility of illness resulting from contamination of private water supplies.

Woodlake

Limited quantities of water stored in aquifers tapped by the City of Woodlake could possibly require the utilization of an imported water supply in the 1980-90 design period. Table VIII-1 indicates that an additional 1,080 gallons per minute will be required by 1980 to meet maximum day plus fire flow requirements with standby storage adequate to meet the projected peak demands. An additional 1,400 gallons per minute will be required, however, to meet 1990 demands and the designated safe yield(1) of the aquifers beneath the city might indicate that a serious overdraft of the groundwater reservoir can occur if this water is obtained from groundwater sources. If this were the case, an imported water supply would have to be sought out. Supplies available from elevated storage are adequate to meet maximum day demands until 1980. If an imported water supply is required, consideration should be given to the provision of standby power to meet the projected emergency requirements for 1990. Recommended future lines are shown on the water system plate.

Tract 92

The production capacity of the existing system which serves the Tract 92 area appears to be adequate to serve the community through the year 1990. Two wells are placed such that uniform pressure is supplied to most parts of the system, however, some source of auxiliary power should be installed to assure that service is maintained during power outage conditions. A few sections of new distribution main are recommended for installation to complete looping of the existing distribution system.

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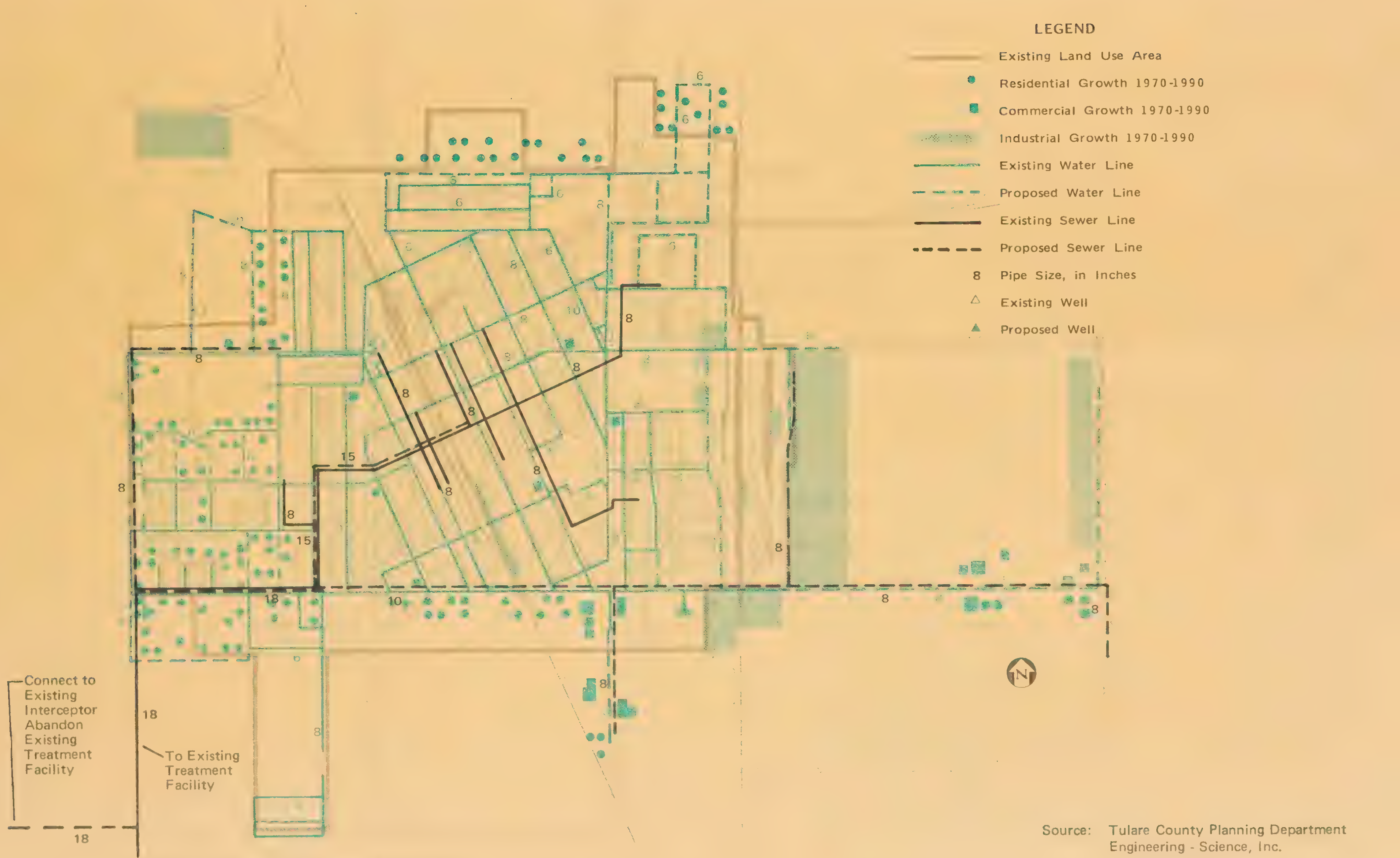
(1) Safe yield = the maximum dependable draft that can be made continuously on a source of water supply during a period of years during which the probable driest period or greatest deficiency in water supply is likely to occur.

Plate-4

EXETER

PROJECTED LAND USE and SERVICES



Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

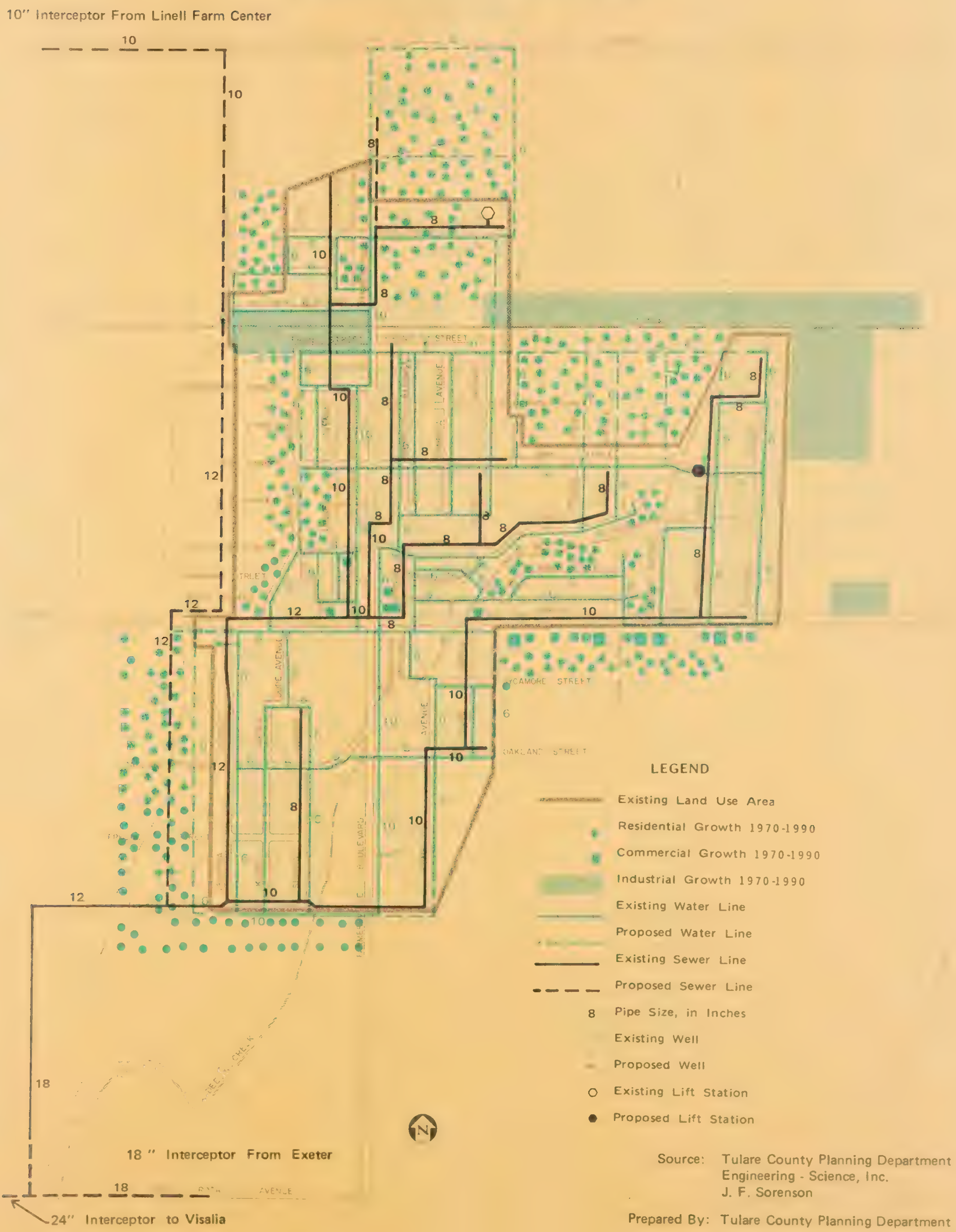
Plate-4-A


EXETER
EXISTING LAND USE
N
LEGEND
Residential
Commercial
School
Industrial
Poor Housing Area
Source: Tulare County Planning Department

Plate-5

FARMERSVILLE

PROJECTED LAND USE and SERVICES



Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-5-A

FARMERSVILLE

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-6

GOSHEN

PROJECTED LAND USE and SERVICES

LEGEND

Existing Land Use Area

Residential Growth 1970-1990

Commercial Growth 1970-1990

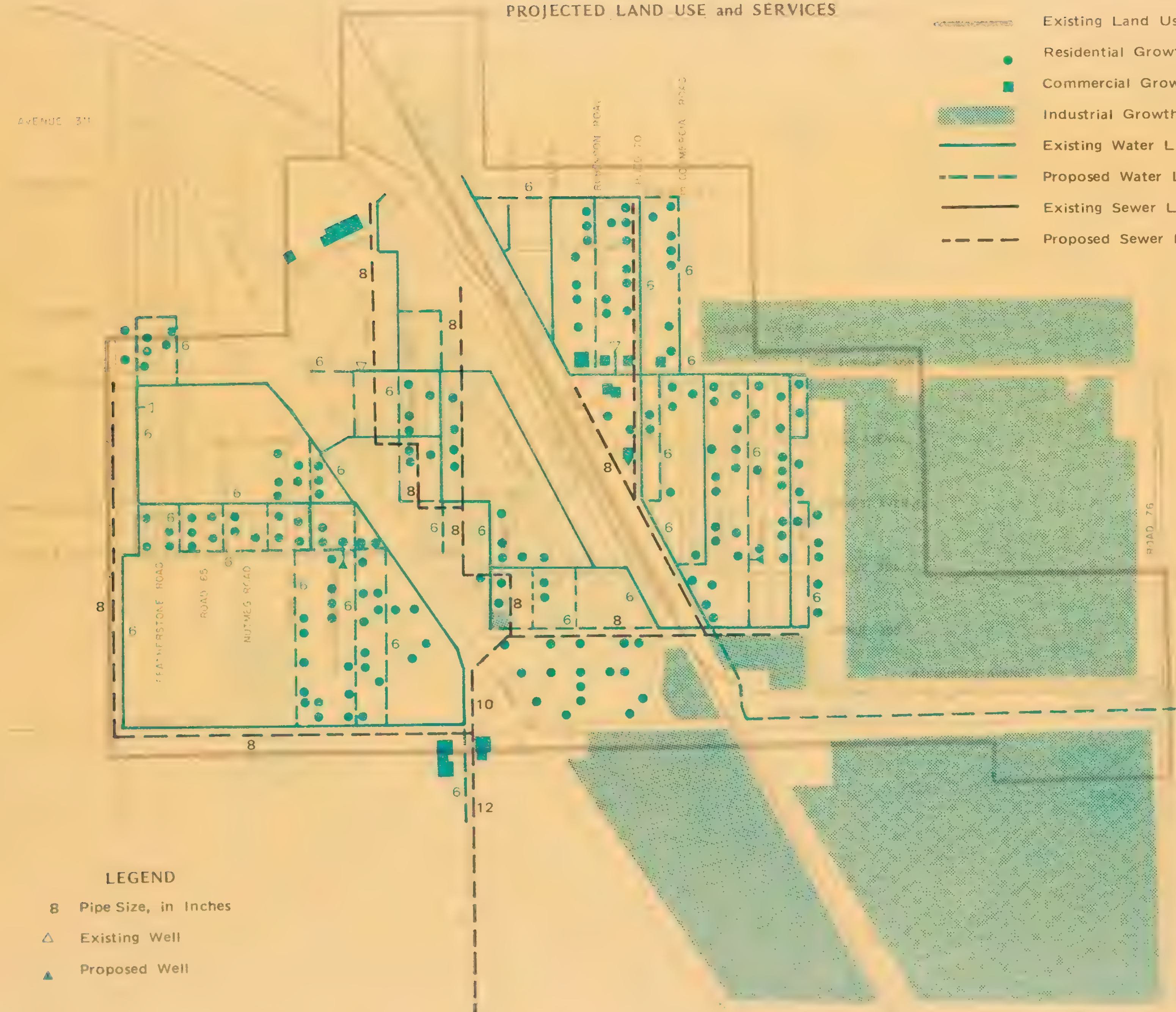
Industrial Growth 1970-1990

Existing Water Line

Proposed Water Line

Existing Sewer Line

Proposed Sewer Line



LEGEND

8 Pipe Size, in Inches

Existing Well

Proposed Well

12" Interceptor to City of Visalia Treatment Facility

Source: Tulare County Planning Department
Engineering - Science, Inc.
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Plate-6-A

GOSHEN

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-7

IVANHOE

PROJECTED LAND USE and SERVICES

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-7-A

IVANHOE

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-8

LEMON COVE

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-8-A

LEMON COVE

PROJECTED LAND USE and SERVICES

Prepared By: Tulare County Planning Department

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Plate 9

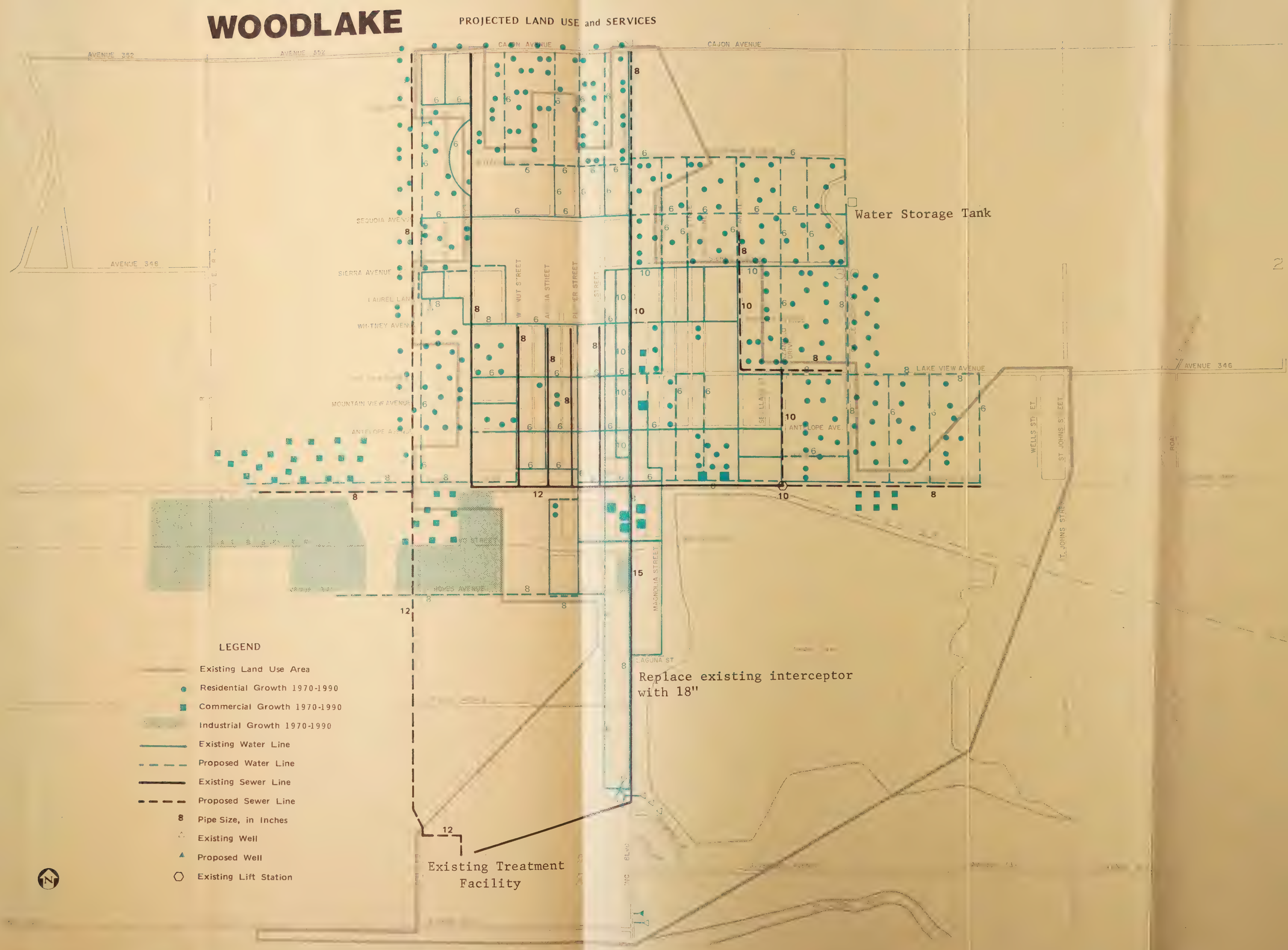

WOODLAKE
PROJECTED LAND USE and SERVICES
Water Storage Tank
Replace existing interceptor with 18"
Existing Treatment Facility
LEGEND
Existing Land Use Area
Residential Growth 1970-1990
Commercial Growth 1970-1990
Industrial Growth 1970-1990
Existing Water Line
Proposed Water Line
Existing Sewer Line
Proposed Sewer Line
8 Pipe Size, in Inches
Existing Well
Proposed Well
Existing Lift Station
CAJON AVENUE
AVENUE 352
LAKE VIEW AVENUE
AVENUE 346
AVENUE 348
SEQUOIA AVENUE
SIERRA AVENUE
MOUNTAIN VIEW AVENUE
ANTELOPE AVE.
MAGNOLIA STREET
LAGUNA ST
WELLS STREET

Plate 9-A

WOODLAKE

EXISTING LAND USE

Source: Tulare County Planning Department

SUB-PLANNING AREA D

Tract 51

The present economic and physical situation of this community raises the question of whether the construction of a community water system is feasible at the present time. However, due to the possibility of contamination from individual sewage treatment systems, it is recommended that Tract 51 be provided with a community water system. Further investigation should be given to the financial implications and funding assistance for the project, however, before any other action is taken.

Lindsay

The City of Lindsay's water system rates as one of the better systems within the county. Recent completion of telemetered controls on the water wells has provided for more efficient operation of the system in addition to aiding in the supply of water at a specified pressure. An emergency circuit is available for use during times of power outage. Projected production capacity requirements indicate that an additional 910 gallons per minute will be required to meet 1980 maximum day plus fire flow requirements and an additional 1,950 gallons per minute capacity to meet 1990 demands. It is anticipated that the 1980 demands can be met by the installation of two wells of 500 gallons per minute minimum capacity. There is a distinct possibility, however, that the 1990 demands will have to be met by an imported water supply due to the quantity and quality of groundwater in the area. This possibility should be considered as the development of Lindsay continues and should be kept in mind when water rights become available to East Side Canal water. The distribution system appears to be adequate at the present time with recommendations for future expansion shown on the water system plate for Lindsay at the end of the chapter.

Plainview

Two separate systems serve the community of Plainview at the present time. It is recommended that these two systems be combined into one system. The combining of these systems would result in a greater efficiency of operation and improved fire protection for the entire community. When this connection is accomplished, provision should also be made to provide standby power on one of the larger wells, possibly on a new well which will be necessary to meet 1980 maximum day plus fire flow requirements. Recommended system elements are shown on the water system plate for Plainview at the end of the chapter.

Strathmore

The water system operated by the Strathmore Community Services District for the community of Strathmore is one of the few adequate systems within the county. The production capacity of the existing system appears to be adequate through the year 1990. Production in excess of that required is also available during periods of power loss. Several lines are required to provide service to proposed expansion areas, however, and these lines are indicated on the Strathmore water system plate at the end of this chapter.

Tonyville

The water supply for the community of Tonyville is provided by the Lindsay-Strathmore Irrigation District. An adequate supply of water is available to meet future requirements both during normal and emergency conditions. Some of the existing distribution mains are not of adequate size to meet the needs of parts of the service area and should be replaced with larger lines in addition to looping of some lines so that uniform supply and pressure will be available throughout the system. A suggested pattern for these mains is shown on the water system plate.

Plate-10

LINDSAY

PROJECTED LAND USE and SERVICES

LEGEND

- Existing Land Use Area
- Residential Growth 1970-1990
- Commercial Growth 1970-1990
- Industrial Growth 1970-1990
- Existing Water Line
- Proposed Water Line
- Existing Sewer Line
- Proposed Sewer Line
- 8 Pipe Size, in Inches
- Existing Well
- Proposed Well

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-10-A

LINDSAY

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-11

STRATHMORE

PROJECTED LAND USE and SERVICES

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-11-A

STRATHMORE

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-22

PLAINVIEW

EXISTING LAND USE and SERVICES

Source: Tulare County Planning Department

SUB-PLANNING AREA E

Allensworth

The community of Allensworth appears to have an adequate water supply to serve maximum day plus fire flow requirements until 1990. The development of an auxiliary power supply is necessary, however, to meet demands during power outage conditions. Since the community water supply is derived from one deep well an auxiliary power supply should be provided on this well. Some additional distribution mains are recommended in order to form a more adequate distribution system. These recommendations should be implemented at the earliest possible date.

Alpaugh

The production capacity of the existing system which serves the community of Alpaugh appears to be adequate to serve the community through 1990. Two wells are placed such that uniform pressure is supplied to most parts of the system and the existing elevated storage is more than adequate to supply projected maximum day demands. The replacement of some small lines is recommended along with the addition of some mains necessary to complete an adequate grid system which will provide uniform supply and pressure throughout the service area. Recommended elements are shown on the water system plate for Alpaugh at the end of the chapter.

Earlimart

The existing water supply wells which serve the Earlimart Public Utility District are each served by a separate electrical circuit in order to provide service to some wells should a partial electrical power outage occur. These circuits are, in turn, connected to one of the five transmission lines which bring power into Earlimart. This method of supplying power during emergency conditions is very effective and efficient. It is anticipated that no other

methods of supplying auxiliary power will be required through the year 1990. Table VIII-1 gives indication that 1,070 gallons per minute additional production will be required to meet 1980 maximum day plus fire flow demands while an additional 140 gallons per minute production will be required to meet 1990 maximum day plus fire flow demands. Due to the amount and location of proposed expansion, several new distribution mains will be required if adequate service is to be provided to these areas. Proposed facilities are shown on the Earlimart water system plate at the end of the chapter.

Pixley

Upon review of developmental projections, it was determined that the existing wells which provide water for the Pixley Public Utility District are adequate to meet maximum day plus fire flow requirements until the year 1990. It should be noted, however, that standby power should be provided on at least one well to provide water to the service area during power outage conditions. Several additional distribution mains are recommended, particularly to serve proposed development in the eastern portion of the community. Those recommendations, along with some recommended improvements to the internal grid system are shown on the water system plate for Pixley at the end of the chapter.

Teviston

Table VIII-1 indicates that an additional 34 gallons per minute capacity will be required to meet the projected 1980 maximum day plus fire flow demands. Due to the projected decrease in population, however, it is recommended that no additional capacity be provided to the system. It is recommended that standby power be provided on the existing well to provide emergency service and that some additional distribution mains, as shown on the water system plate for Teviston be installed.

Plate-23

ALPAUGH

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-12

EARLIMART

PROJECTED LAND USE and SERVICES

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-12-A

EARLIMART

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-13

PIXLEY

PROJECTED LAND USE and SERVICES

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-13-A

PIXLEY

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-15

TIPTON

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-15-A

TIPTON

PROJECTED LAND USE and SERVICES

LEGEND

Existing Land Use Area

Residential Growth 1970-1990

Commercial Growth 1970-1990

Industrial Growth 1970-1990

Existing Water Line

Proposed Water Line

Existing Sewer Line

Proposed Sewer Line

8 Pipe Size, in Inches

△ Existing Well

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Plate-16

WOODVILLE

PROJECTED LAND USE and SERVICES

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-16-A

WOODVILLE

EXISTING LAND USE

Source: Tulare County Planning Departmet

Tipton

The production capacity of the two existing wells which serve the community of Tipton appear to be able to serve maximum day plus fire flow requirements through the year 1990. A 25,000 gallon elevated storage tank is presently an integral part of the system, but it is not anticipated that it will be able to supply maximum day demands for the required period during a power outage condition. It is therefore recommended that a source of auxiliary power be made available to at least one of the existing wells in order that an adequate supply of water is available to all parts of the service area under emergency conditions caused by power outage.

Woodville

Projected residential development in the southern portion of the community will require that water distribution mains be installed to provide water service to this area. Production from the existing wells is adequate to serve the proposed population until 1990, however, an auxiliary power source should be installed on one of the existing wells to provide service should an extended power failure occur.

Woodville Farm Center

Recent fire flow tests by the Pacific Fire Rating Bureau indicate that the water system which provides service to the Woodville Farm Center provides service in excess of that required by the Bureau. The production capacity requirements as presented in Tables VIII-1 and VIII-2 support the findings of the aforementioned tests. In addition, the water distribution system appears to be adequate to serve the center until 1990.

SUB-PLANNING AREA F

Ducor

The water system which serves the community of Ducor is providing a sub-standard service at the present time. An additional 450 gallons per minute production is required to bring the system up to minimum acceptable county standards and a minimum of 32 gallons per minute emergency production will be required by 1990. It is anticipated that three additional wells will be necessary to meet these demands, with at least one well being provided with standby power. The distribution system should also be improved to provide a more adequate system by which to distribute the water. Recommended system elements are shown on the water system plate for Ducor at the end of the chapter.

Poplar-Cotton Center

At the present time one water system serves the Poplar Community Service District and another system serves the community of Cotton Center. It is recommended that these two systems be interconnected so that the system will operate more efficiently and will provide improved fire protection for the area. It is estimated that the existing wells will provide an adequate water supply to meet maximum day plus fire flow requirements; however, an auxiliary power supply will have to be provided to at least one well to provide maximum day flows during power outage conditions. A suggested method for interconnecting the two systems is shown on the water system plate for Poplar-Cotton Center as are recommended improvements to the main distribution lines.

Richgrove

The current rate structure does not provide capital for improvements to the water system owned by the Richgrove Mutual Water Company; in fact, it does not supply enough funds for proper maintenance of the system, so that it is in a deteriorating condition. Several improvements are contemplated when money

Plate-14

POPLAR-COTTON CENTER

EXISTING LAND USE and SERVICES

Source: Tulare County Planning D
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-17

RICHGROVE

PROJECTED LAND USE and SERVICES

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-17-A

RICHGROVE

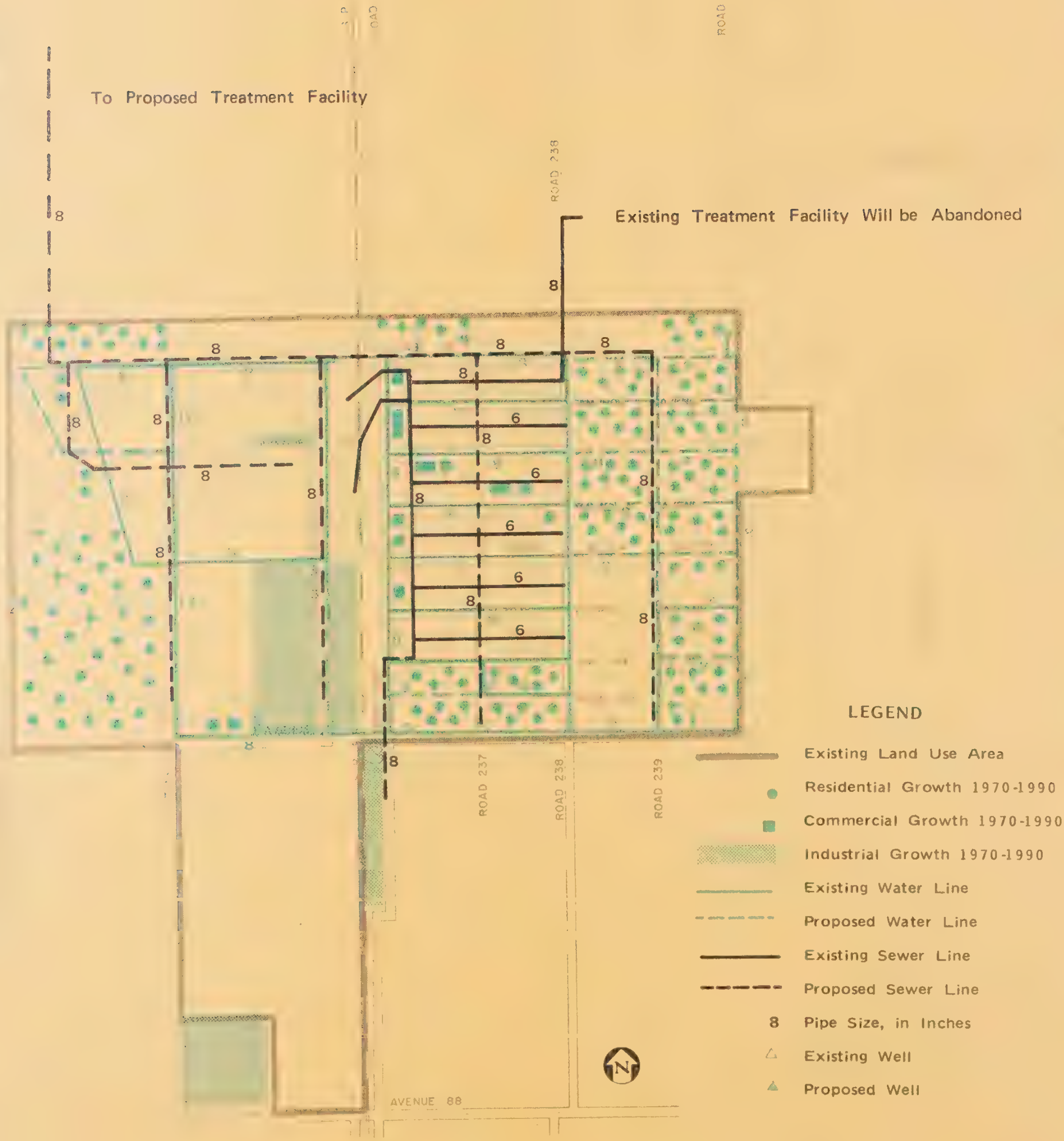
EXISTING LAND USE

Source: Tulare County Planning Department

Plate-18

TERRA BELLA

PROJECTED LAND USE and SERVICES



Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-18-A

TERRA BELLA

EXISTING LAND USE

Source: Tulare County Planning Department

becomes available such as the installation of larger water mains and the placing of a new bowl and new pump on one of the existing wells. It is anticipated, however, that several new wells will have to be drilled to meet projected production requirements. An additional 1,000 gallons per minute production will be required by 1990 to meet maximum day plus fire flow demands with auxiliary power being required on at least two wells. Several distribution mains are also recommended to provide service to projected expansion areas.

Terra Bella

Several improvements to the water system which serves the community of Terra Bella must be made for the system to meet future demands. An additional 400 gallons per minute production capacity will be required by 1990 with some provision for emergency supply being required at the present time. Exactly what would be the best answer to this problem can only be determined after more detailed examination of the system needs. Several distribution mains are also required to supply projected expansion areas. The recommended location for these facilities is shown on the water system plate for Terra Bella at the end of the chapter.

Tract 213

The Rowland Water Company currently provides domestic water service to Tract 213. Tables VIII-1 and VIII-2 indicate that an additional well with standby power will be required to meet future requirements. The distribution system appears to be adequate at the present time; recommended future lines are shown on the water system map for Tract 213 at the end of the chapter.

SUB-PLANNING AREA G

Camp Nelson

Three private water companies currently serve the Camp Nelson area. Specific data concerning the Pierpoint Water Company was not available. The production capacity of the Camp Nelson Water Company and Creer Water Company, if combined, would appear to be able to provide maximum day plus fire flow requirements until 1990. The existing distribution system is unable to deliver these flows, however, and thus several improvements must be made to any combined distribution system. The two systems should be interconnected with water mains of substantial size which could provide a high volume interchange of water at relatively low head losses. The upgrading of several loops within the resulting grid system is also recommended, primarily to deliver required fire flow to outlying portions of the system. The quantity of water available is fixed and thus efforts should be made to effectively utilize that which is available.

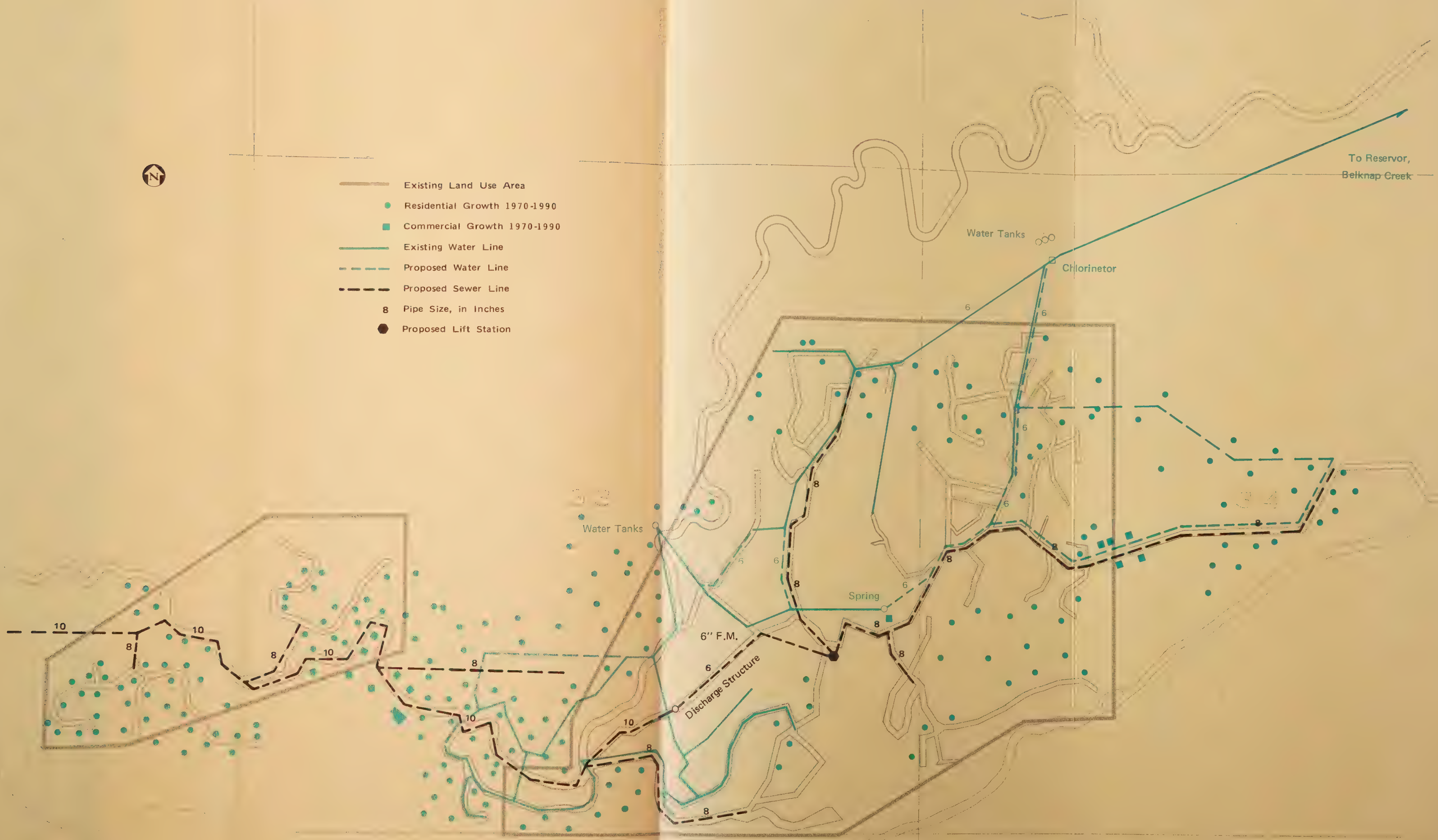
Springville

The most important consideration involving the water supply system for the community of Springville is that adequate water supplies be delivered to the filtration stations operated by the Springville Public Utility District and Tulare County. Negotiations are in progress now to insure that this will be accomplished in the near future. Plans are also currently being discussed to enlarge the water supply pipe and to provide booster pumps within the system. Recommended future system elements are shown on the water system plate at the end of the chapter for Springville.

Plate 19

CAMP NELSON

PROJECTED LAND USE and SERVICES



Source: Tulare County Planning Department
Engineering - Science, Inc.
J.F. Sorenson

Plate 19-A

CAMP NELSON

EXISTING LAND USE

Source: Tulare County Planning Department

Plate-20

SPRINGVILLE

PROJECTED LAND USE and SERVICES

Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

Plate-20-A

SPRINGVILLE

EXISTING LAND USE

Source: Tulare County Planning Department

SUB-PLANNING AREA H

Three Rivers

Development has taken place in the Three Rivers area over a long period of years with early use basically agricultural. The area provided winter quarters for many people who worked in the higher elevations during the summer months. Water was a requirement of these early settlers and it was obtained from shallow wells near the Kaweah River and its channels as well as ditches which took water directly from the natural flows of the river and its tributaries. As additional homes were built, more wells were drilled and several community water systems were constructed. Some of these were financed and constructed by public entities while others were developed as private companies or mutual water companies.

At present, there is difficulty in supplying water of high quality and sufficient quantity. Additional diversions of surface waters at Three Rivers in excess of present uses are limited by higher priority long-established water rights held by diverters, mainly downstream on the valley floor. Further, Kaweah River flows during August, September and October often are so low as to make it nearly infeasible to make direct diversions for recognized rights, and any new rights could certainly not be allocated during this period of the year, even if it were possible during full flow conditions.

Low flow data presented in Table VIII-3 shows the flow conditions which have prevailed in recent years. The shortage of sufficient live flows to permit self-cleansing and purification is evident when it is noted that flows as low as 10 cfs occurred in 1971 throughout the entire Kaweah River system, with flows of 0.1 cfs observed in the South Fork.

TABLE VIII-3

NATURAL FLOW OF THE KAWEAH RIVER
NEAR THREE RIVERS, CALIFORNIA (1)

Water Year	Month	Day	Discharge (3) (second-feet)	South Fork Discharge (second-feet)
1924	August	31	9	
1925	October	1 - 5	13	
1931	August	25 - 29	14	
1931	September	30	15	
1932	October	16	13	
1934	September	18 & 19	9	
1935	October	1	12	
1949	September	24 & 25	18	(2)
1961	September	28 - 30	22	0.1
1961	October	16 - 19 & 31	16	0.1
1971	September	13	10	0.8

(1) Data from U. S. Geological Survey, State of California Department of Water Resources, Kaweah River Association Annual Reports, and Kaweah Delta Water Conservation District.
(2) Flows were not measured on the South Fork prior to 1958.
(3) Includes South Fork flows.

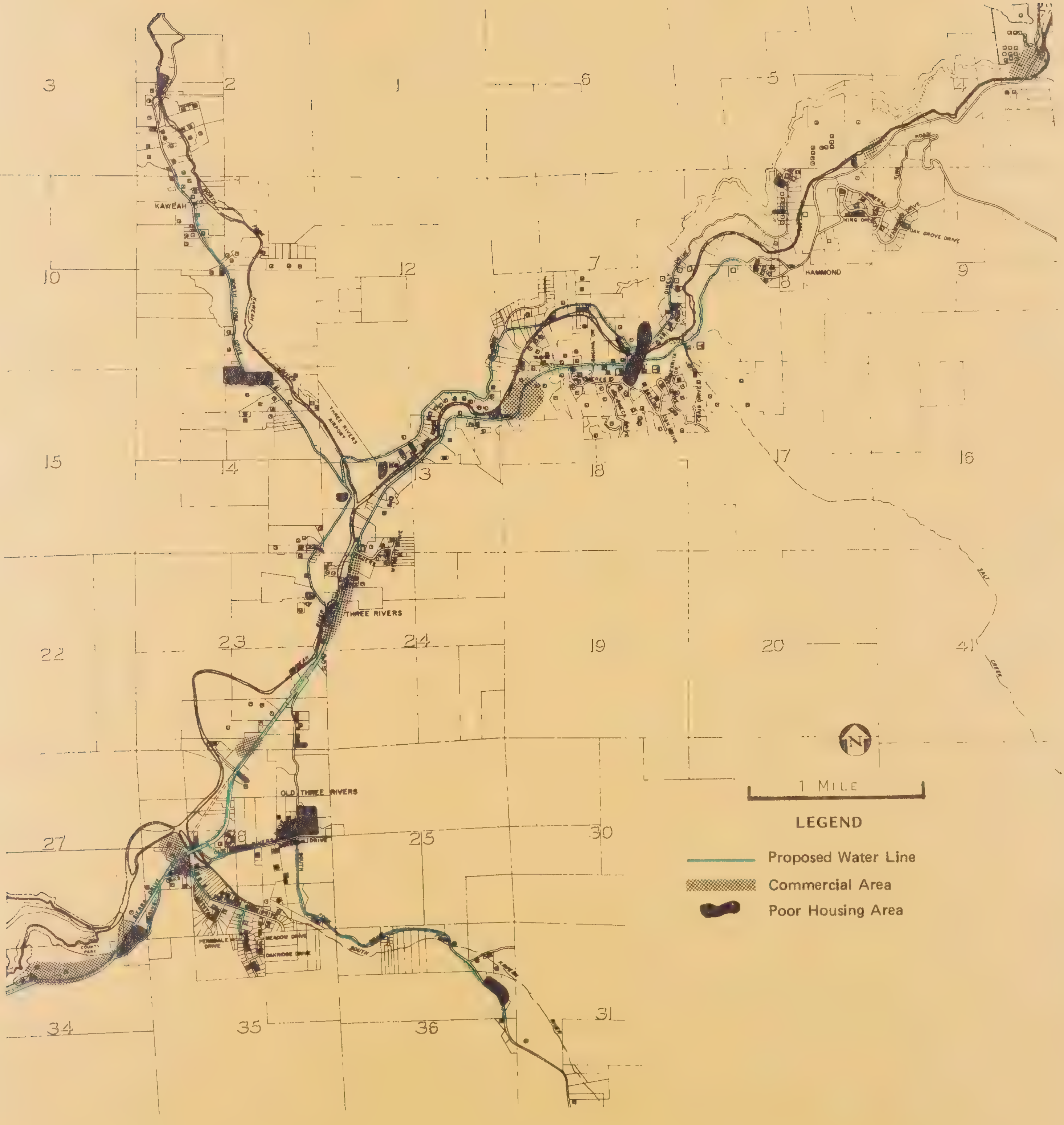
The gradual build-up of densities of population in the Three Rivers area has generally taken place without the installation of purification equipment on supply systems which derive water directly from the Kaweah River. Some new systems utilize chlorination or ultra violet processes, but most older systems do not treat their water before distribution. All existing developments utilized individual septic tank systems for treatment of sewage wastes and in several instances effluent which has received inadequate treatment has reached the river, resulting in contamination of raw water supplies for downstream domestic users. The water quality in Terminus Reservoir is likewise in danger under such conditions. To alleviate this situation, additional river flow and adequate sewage treatment is required.

Increasing concern over inadequate supplies of potable water has resulted in several attempts to improve the water supplies in the last five years. To date,

Plate-21

THREE RIVERS

LAND USE and PROJECTED SERVICES



Source: Tulare County Planning Department
Engineering - Science, Inc.
J. F. Sorenson

Prepared By: Tulare County Planning Department

however, no projects have been initiated although several events have brought the matter into focus.

Probably the most important event in recent years has to do with the proposed development of the Wells Ranch on Horse Creek into a recreational subdivision of several hundred lots. The developer found the on-site water supply to be inadequate to service the proposed subdivision. Subsequently, the developer entered into a contract to purchase up to 8,000 acre feet annually from downstream diverters. This was done in contemplation of storing the water in Terminus Reservoir for re-diversion by pumping up to the subdivision area.

During the extended negotiations for the storage and re-diversion of the water, the U. S. Army Corps of Engineers raised questions as to quality standards for surface and underground outflow from the proposed subdivision, whose drainage area lies tributary to Terminus Reservoir. At the present time, plans to proceed with the development have been delayed and its future is questionable.

Two types of wells have been satisfactory sources of water in limited areas: (1) Shallow wells generally located adjacent or near the river channels where river underflow is the water source; (2) Wells tapping underground supplies tributary to the river channels have been satisfactory except during drought periods. These wells have been the usual single hole and casing type or the "wagon-wheel" or "spoke" type. The former consists of six to 12 inch case (lined with watertight casing) wells generally extending to bedrock. The latter wells usually extend into solid rock utilizing three foot to five foot diameter holes with two inch or larger lateral pipes extending outwards horizontally up to 500 feet, each through water bearing aquifers, to intercept underground flows and move the water to the central holes from whence it is pumped into the surface. Wagon-wheel wells obviously only operate successfully where there is a satisfactory source to replenish the groundwater reservoir. Water quality

problems often occur in the use of the shallow river-side wells but are not usual or likely in wells of the "wagon-wheel" type.

With increasing demands for foothill and mountain accommodations for residential, recreational, and retirement use, solutions to the perplexing Three Rivers problems of water quantity and quality will be required. Modern techniques of land use planning call for preservation of prime flat valley lands for agricultural uses thereby increasing the demands for urban type development in the foothill areas.

Several alternatives for supplying future water requirements have been investigated and are discussed in the following paragraphs.

<u>Alternative A</u>

Alternative A involves the staged interconnection of the existing water supply systems in the Three Rivers area. There are several water districts and water companies which share common boundaries and others which are only a relatively short distance from each other; both these situations would benefit in many ways by the interconnection of separate systems. The implementation of this alternative could provide a more adequate water supply to those systems which are water deficient at the present time if acceptable legal and organizational procedures can be established. Additionally, a basis would be provided for the efficient utilization of existing supplies. Alternative "A" recommends the "staged" implementation approach due to the negotiations and design projects which would be required to implement this approach. The implementation of these proposals would also provide the basic system for the distribution of imported water supplies should they become available in the future. It should be noted that the implementation of this alternative will not allow for a substantial increase of residential expansion under existing supply conditions;

the alternative only provides for the equitable distribution of present water resources to the existing services.

Alternative B

The implementation of Alternative B is based on the acquisition of either existing Kaweah River water rights or other imported water supplies. Several independent investigations and examinations have been made of existing water rights on the Kaweah River to ascertain ways by which the residents of Three Rivers could take water by means of prescriptive action, but such solutions as have been presently outlined appear to be impractical and infeasible. Several upstream reservoir sites for storage and utilization of flood flows have been investigated without positive indications that any one or a combination of projects is currently physically or economically feasible.

Two possibilities exist for the acquisition of water rights at the present time; however, both possibilities would require an extensive capital outlay for the acquisition of rights to the water and for facilities to treat and distribute the water once acquired. The first possibility involves the purchase of the water which has been contracted for use in the Wells Ranch subdivision by Boise-Cascade. The status of this subdivision is, at this time, uncertain and therefore the acquisition of such water is also uncertain. The second possibility is the exchange of existing Kaweah River water rights at Lake Kaweah for purchased water from the East Side Project. This exchange can only be made, however, with the cooperation of downstream water users when the East Side Project becomes a reality. The cost of water from either source is not definitely known at the present time, although 32 dollars per acre-foot has been estimated for East Side Project water. Were water to become available to the Three Rivers area from either of these sources, transmission and distribution facilities would be required to deliver the water to individual services. Additionally, treatment

facilities would be required to insure that the delivered water would meet public health standards. Table VIII-5 presents a capital cost analysis for facilities recommended to implement this alternative. The water system plate for the Three Rivers Area shows recommended distribution facilities, but it should be kept in mind that these are only the larger mains; smaller mains and individual services are not shown.

RECOMMENDED WATER SUPPLY PLAN

1. It is expected that most valley-floor cities, districts and communities will continue to obtain water supplies from groundwater sources. Supplies to meet the needs of certain communities close to the foothills, such as the cities of Woodlake and Lindsay, are anticipated from a combination of groundwater and imported supplemental surface water. These assumptions are based on confidence that the quality of groundwater will continue to remain above the minimum standards established by public health authorities.

2. To maintain groundwater of proper quality and at feasible pumping depths, it will be necessary that additional supplemental surface water supplies be brought to Tulare County. Through management and conjunctive use of surface and groundwaters, it will be possible to make use of the large groundwater storage capacity underlying Tulare County.

3. The proposed East Side Division of the Central Valley Project is under consideration to convey water from the Sacramento area to service areas along the east side of the San Joaquin Valley. Authorization and construction of this facility is a necessity if present and future water deficiencies are to be overcome. No other proposal appears to have long-range economic or political feasibility. Interim arrangements for interconnection and exchange through federal, state and local facilities are under investigation.

4. Entities away from the valley floor not located on major streams generally do not have groundwater aquifers or supplies sufficient to meet additional future needs. Until adequate surface water can be made available by direct delivery or by exchange, growth of many of the mountain or foothill communities will be severely restricted.

5. The examination of existing water systems within the county has shown that a potential exists for the contamination of private water supplies in several small communities utilizing individual septic tanks and leaching fields for sewage treatment and disposal. In order to provide an adequate water supply free of bacteriological contamination, community water systems are recommended for several areas which heretofore have been served solely by private wells. The provision of such a supply should also provide minimum fire flows as required by the county and the Pacific Fire Rating Bureau.

6. Many of the existing central water supply systems which exist within the county do not provide sustained flows which would be considered minimum by Tulare County standards. The improvement of these systems should be an item of utmost priority, especially if future population projections become a reality.

7. The provision of additional auxiliary power to water supply and distribution facilities is vitally important to the total public interest. Many of the existing systems are grossly inadequate in terms of ability to supply minimum fire flow requirements plus maximum day demands with all wells operating; these inadequacies would be compounded if a fire were to occur during power outage conditions.

TABLE VIII-4

SUMMARY OF CAPITAL COSTS
RECOMMENDED WATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA A		
CUTLER-OROSI		
Distribution Mains	347,500	119,800
Wells and Pumping Equipment	64,500	21,500
Standby Power Source	26,400	8,800
Subtotal	$ 438,400	$ 150,100
E & C (a)	109,200	37,700
Cost of Lands	3,800	1,300
Total Capital Cost	$ 551,400	$ 189,100
DELFT COLONY		
Distribution Mains	64,800	
Wells and Pumping Equipment	16,200	
Standby Power Source	9,700	
Subtotal	$ 90,700	
E & C (a)	22,700	
Cost of Lands	1,300	
Total Capital Cost	$ 114,700	
EAST OROSI		
Distribution Mains	12,000	
Wells and Pumping Equipment	9,600	
Standby Power Source	6,500	
Subtotal	$ 28,100	
E & C	7,300	
Cost of Lands	1,300	
Total Capital Cost	$ 36,700	
LONDON		
Distribution Mains	21,600	
Wells and Pumping Equipment	20,600	
Standby Power Source	6,800	
Subtotal	$ 49,000	
E & C	12,300	
Cost of Lands	2,600	
Total Capital Cost	$ 63,900	

TABLE VIII-4 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA A		
SEVILLE		
Distribution Mains	17,600	
Wells and Pumping Equipment	10,800	
Standby Power Source	6,300	
Subtotal	$ 34,700	
E & C	8,700	
Cost of Lands	1,300	
Total Capital Cost	$ 44,700	
SULTANA		
Distribution Mains	94,800	
Wells and Pumping Equipment	21,500	
Standby Power Source	8,700	
Subtotal	$ 125,000	
E & C	31,200	
Cost of Lands	1,300	
Total Capital Cost	$ 157,500	
TRAVER		
Distribution Mains	30,600	8,000
Standby Power Source	1,800	
Subtotal	$ 32,400	$ 8,000
E & C	8,100	2,000
Total Capital Cost	$ 40,500	$ 10,000
SUB-PLANNING AREA B		
EXETER		
Distribution Mains	174,200	117,000
Wells and Pumping Equipment	23,000	17,800
Standby Power	18,400	8,100
Subtotal	$ 215,600	$ 142,900
E & C	53,900	35,600
Cost of Lands	2,600	1,300
Total Capital Cost	$ 272,100	$ 179,800

TABLE VIII-4 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA B (Continued)		
FARMERSVILLE		
Distribution Mains	74,800	108,500
Wells and Pumping Equipment	32,000	21,200
Standby Power	17,400	8,000
Subtotal	$ 124,200	$ 137,700
E & C	31,100	34,400
Cost of Lands	2,600	1,300
Total Capital Cost	$ 157,900	$ 173,400
GOSHEN		
Distribution Mains	156,600	56,600
Wells and Pumping Equipment	33,000	10,500
Subtotal	$ 189,600	$ 67,100
E & C	47,400	16,800
Cost of Lands	2,600	1,300
Total Capital Cost	$ 239,600	$ 85,200
IVANHOE		
Distribution Mains	123,500	
Wells and Pumping Equipment	11,800	
Standby Power	6,500	
Subtotal	$ 141,800	
E & C	35,400	
Cost of Lands	1,300	
Total Capital Cost	$ 178,500	
LEMON COVE		
Distribution Mains	63,600	
Wells and Pumping Equipment	13,000	
Standby Power	8,100	
Subtotal	$ 84,700	
E & C	21,200	
Cost of Lands	1,300	
Total Capital Cost	$ 107,200	

TABLE VIII-4 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA B (Continued)		
PATTERSON TRACT		
Distribution Mains	32,400	
Wells and Pumping Equipment	12,800	
Standby Power	6,800	
Subtotal	$ 52,000	
E & C	13,000	
Cost of Lands	1,300	
Total Capital Cost	$ 66,300	
OAK RANCH		
Distribution Mains	20,400	
Standby Power	11,000	
Subtotal	$ 31,400	
E & C	7,800	
Total Capital Cost	$ 39,200	
TOOLEVILLE		
Distribution Mains	29,600	
Wells and Pumping Equipment	19,500	
Standby Power	8,100	
Subtotal	$ 57,200	
E & C	14,300	
Cost of Lands	1,300	
Total Capital Cost	$ 72,800	
WOODLAKE		
Distribution Mains	209,100	206,900
Wells and Pumping Equipment	16,200	
Treatment Facilities		280,000
Standby Power		8,100
Subtotal	$ 225,300	$ 495,000
E & C	56,400	123,800
Cost of Lands	2,600	15,000
Total Capital Cost	$ 284,300	$ 633,800

TABLE VIII-4 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA B (Continued)		
TRACT 92		
Distribution Mains	4,800	
Standby Power	7,900	
Subtotal	$ 12,700	
E & C	3,800	
Total Capital Cost	$ 16,500	
SUB-PLANNING AREA C		
TRACT 51		
Distribution Mains	37,200	26,400
Wells and Pumping Equipment	20,000	
Standby Power	8,100	
Subtotal	$ 65,300	$ 26,400
E & C	16,300	6,600
Cost of Lands	1,300	
Total Capital Costs	$ 82,900	$ 33,000
SUB-PLANNING AREA D		
LINDSAY		
Distribution Mains	287,700	239,700
Wells and Pumping Equipment	39,600	
Treatment Facilities		290,000
Subtotal	$ 327,300	$ 529,700
E & C	81,900	132,000
Cost of Lands	2,600	15,000
Total Capital Costs	$ 411,800	$ 676,700
PLAINVIEW		
Distribution Mains	5,600	
Wells and Pumping Equipment		15,000
Standby Power	5,800	
Subtotal	$ 11,400	$ 15,000
E & C	2,900	3,900
Cost of Lands		1,300
Total Capital Cost	$ 14,300	$ 20,200

TABLE VIII-4 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA D (Continued)		
STRATHMORE		
Distribution Mains	60,400	39,200
E & C	15,100	9,800
Total Capital Cost	$ 75,500	$ 49,000
TONYVILLE		
Distribution Mains	12,400	
E & C	3,100	
Total Capital Cost	$ 15,500	
SUB-PLANNING AREA E		
ALLENSWORTH		
Distribution Mains	33,600	
Standby Power	8,700	
Subtotal	$ 42,300	
E & C	10,600	
Total Capital Cost	$ 52,900	
ALPAUGH		
Distribution Mains	50,800	
E & C	12,700	
Total Capital Cost	$ 63,500	
EARLIMART		
Distribution Mains	93,600	
Wells and Pumping Equipment	28,600	17,700
Subtotal	$ 122,200	$ 17,700
E & C	30,600	4,400
Cost of Lands	1,300	1,300
Total Capital Costs	$ 154,100	$ 23,400

TABLE VIII-4 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA E (Continued)		
PIXLEY		
Distribution Mains	23,000	
Standby Power	5,900	
Subtotal	$ 28,900	
E & C	7,200	
Total Capital Cost	$ 36,100	
TEVISTON		
Distribution Mains	21,600	
Standby Power	8,100	
Subtotal	$ 29,700	
E & C	7,400	
Total Capital Cost	$ 37,100	
TIPTON		
Distribution Mains	116,100	
Standby Power	9,600	
Subtotal	$ 125,700	
E & C	31,400	
Total Capital Cost	$ 157,100	
WOODVILLE		
Distribution Mains	47,000	10,000
Standby Power	11,000	
Subtotal	$ 58,000	$ 10,000
E & C	14,500	2,500
Total Capital Cost	$ 72,500	$ 12,500

TABLE VIII-4 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
	SUB-PLANNING AREA F	
DUCOR		
Distribution Mains	82,800	
Wells and Pumping Equipment	30,000	
Standby Power	7,500	
Subtotal	$ 120,300	
E & C	30,000	
Cost of Lands	1,300	
Total Capital Cost	$ 151,600	
POPLAR-COTTON CENTER		
Distribution Mains	69,400	
Standby Power	9,500	
Subtotal	$ 78,900	
E & C	19,700	
Total Capital Cost	$ 98,600	
RICHGROVE		
Distribution Mains	81,500	20,800
Wells and Pumping Equipment	46,000	
Standby Power	10,500	
Subtotal	$ 138,000	$ 20,800
E & C	34,500	5,200
Cost of Lands	1,300	
Total Capital Cost	$ 173,800	$ 26,000
TERRA BELLA		
Distribution Mains	144,000	15,000
Standby Power	6,300	
Subtotal	$ 150,300	$ 15,000
E & C	38,200	3,800
Total Capital Cost	$ 188,500	$ 18,800

TABLE VIII-4 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA F (Continued)		
TRACT 213		
Distribution Mains	6,000	
Wells and Pumping Equipment	10,200	
Standby Power	6,800	
Subtotal	$ 23,000	
E & C	5,800	
Cost of Lands	1,300	
Total Capital Cost	$ 30,100	
SUB-PLANNING AREA G		
CAMP NELSON		
Distribution Mains	48,800	4,600
E & C	12,200	1,500
Total Capital Cost	$ 61,000	$ 6,100
SPRINGVILLE		
Distribution Mains	99,100	
E & C	24,800	
Total Capital Cost	$ 123,900	

(1) 1971 cost basis (ENR = 1500).
(a) Engineering and contingencies calculated at 25 percent of capital cost.

TABLE VIII-5

COST ANALYSIS

THREE RIVERS AREA

Alternative B

Initial Capital Cost	$1,839,000	
Annual Amortized Cost (1)		$ 134,200
Annual O & M Cost of Treatment Facilities (2)		44,000
Annual O & M Cost of Distribution Facilities (3)		6,000
Total Annual Cost		$ 184,200
Annual Cost per Family (4)		$ 460

(1) Capital cost amortization at 6 percent interest for 30 years.
(2) Annual operation and maintenance costs (O & M).
(3) Includes annual O & M of booster pumps.
(4) Based on an assumed 400 permanent families residing in the Three Rivers Area.

REGIONAL WASTEWATER MANAGEMENT CONSIDERATIONS

Wastewater management in Tulare County should endeavor to accomplish the following objectives: (1) protection of public health, (2) balance of environmental ecology, and (3) maximum reclamation of water resources. The wastewater management plan recommended in this study was developed to achieve these objectives.

Beneficial Reuse Potentials

The concept of wastewater reclamation and reuse has been recognized as an integral aspect of wastewater disposal and a partial answer to the overall water shortage problem. Numerous uses for reclaimed water exist, including: (1) crop irrigation, (2) groundwater recharge, (3) industrial reuse, and (4) recreational purposes. Each of these uses require water of certain quality which may determine the type and degree of treatment required.

Portions of Tulare County presently utilize treatment plant effluents for irrigation and groundwater recharge. Primary and other nonoxidized effluents may be utilized for irrigating many crops (essentially all but truck crops) and oxidized effluent can be used with few restrictions.

With increasing demands upon the limited water resource, the utilization of treatment plant effluents may soon be expanded to include more industrial and recreational uses. Public health standards will, of course, require more advanced treatment than is presently employed in most areas of Tulare County. Existing public health standards require, in effect, that water used for irrigating golf courses, for supplying lakes used for boating and fishing, etc., meet essentially drinking water standards with respect to bacteriological quality. In addition, the total mineral solids of the discharged effluent must be comparable to existing groundwater supplies in order to further protect this limited supply.

Potentials for Regionalization

One of the primary objectives of the California Regional Water Quality Control Board is to achieve consolidation, where practicable, of independent wastewater treatment facilities. However, economic factors and effluent disposal considerations limit the extent to which consolidation of independent facilities can be accomplished. Several communities within the planning area lend themselves to this regionalized concept of collection and treatment within practical financial limitations, and the recommended systems which are presented herein illustrate the extent to which this type of plan may be reasonably implemented. In the development of the Tulare County wastewater management plan, consideration was given to the operation of smaller independent treatment facilities until such time as the area urbanizes to an extent which would permit the abandonment of these existing facilities and consolidation of the tributary system with a regional facility.

Pretreatment of Industrial Wastewaters

With the exception of Lindsay, all of the recommended systems assume that most industrial wastewaters will ultimately be discharged to municipal systems. Industry has the option of treating and disposing of liquid wastes on an independent basis; however, the limiting discharge requirements applicable to such a discharge would be the same as those applied to municipal waste discharges. The dilution and equalization resulting from mixing industrial and domestic wastewater flows and the economy of scale normally achieved in the construction of larger treatment facilities suggest that it is usually most economical for industries to discharge to a central treatment facility. This does not imply, however, that no treatment would be required at the individual industrial sites.

Special processes, commonly referred to as pretreatment processes, can be designed for and used primarily in the management of specific problem constituents

which are unique to a particular industry and which are not economically treatable in municipal systems. Communities receiving industrial wastewaters should consider adoption of wastewater discharge ordinances including the limiting parameters presented in Table VIII-2.

Disposal of Non-Reclaimable Wastewaters

Certain industrial wastes contain materials which render them unusable or of questionable value for reclamation. This type of industrial waste is not prevalent in the planning area at the present time; however, it could become a factor in the future. Should these types of industries choose to locate in the area in the future, they should be carefully located so that the resulting wastewaters may be treated independently of all other wastewaters. Effluents should be disposed of by specialized methods or exported from the area.

TABLE VIII-6

WASTEWATER DISCHARGE ORDINANCE
LIMITING PARAMETERS

Constituent, Characteristic, or Quality of Discharge	Limiting Parameter
Average Daily Flow as percent of City Flow(a)	2.0 Percent
BOD_5 (a)	300 ppm
Suspended Solids (SS) (a)	350 ppm
pH	5.5-9.0
Grease Content	100 ppm
Temperature	150° F
Inflammable or Explosive Liquid	Not Allowed
Unshredded Garbage	N.A.
Ashes, Shavings, Feathers, etc.	N.A.
Toxic or Poisonous Substances	N.A.
Noxious or Malodorous Gases	N.A.
Storm Water, Cooling Water, Subsurface Drainage, etc.	N.A.

(a) Wastewaters exceeding these limits may be allowed subject to approval by the appropriate authority; however, additional payments are generally required as determined by wastewater quantity and BOD and SS loadings.

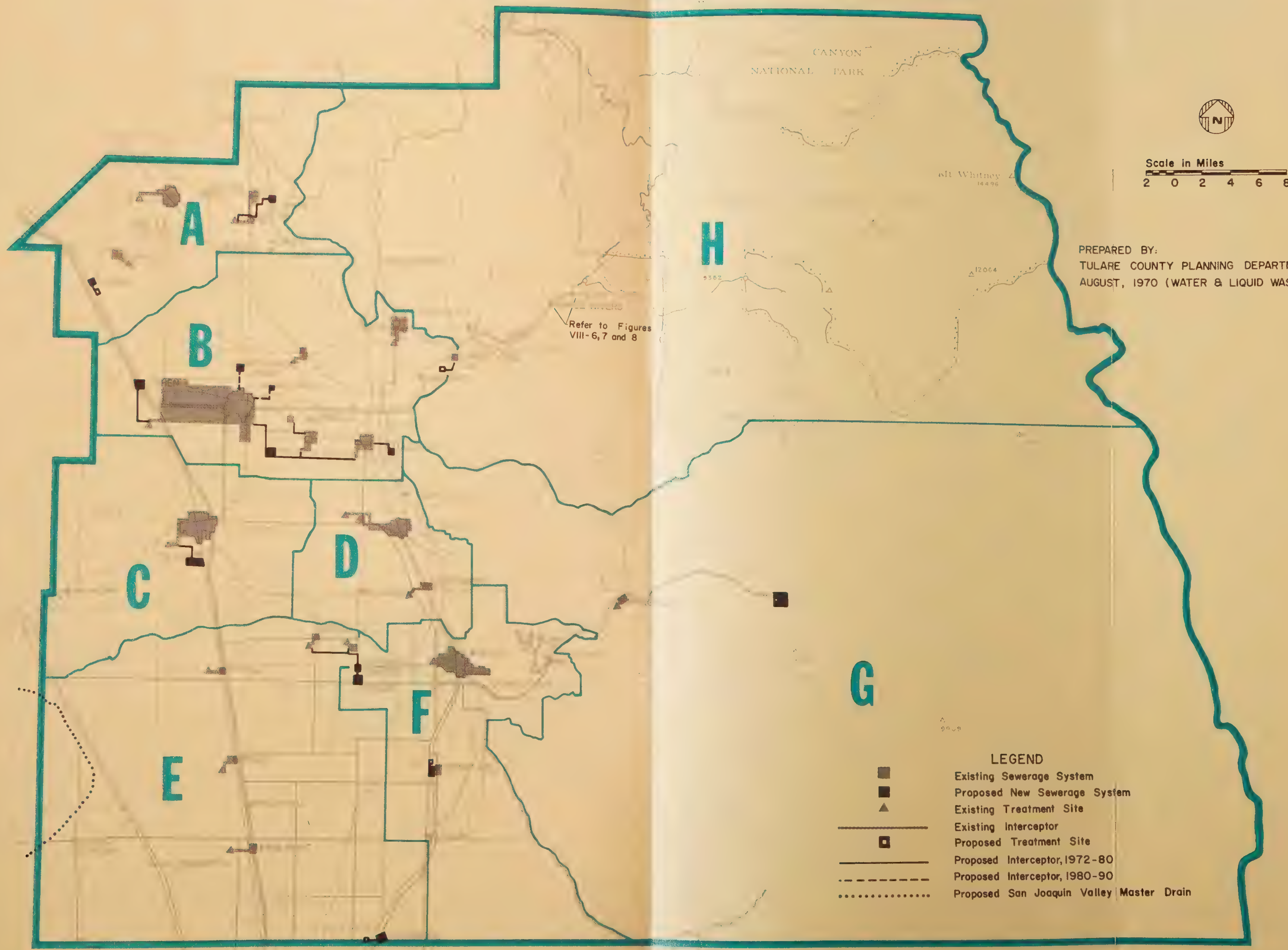
When construction is completed, the San Joaquin Master Drain Project may provide a possible method of disposal for some non-reclaimable wastewaters. The primary need for the drain has arisen as a result of an increase in nitrates resulting from greater amounts of arable land being put into production. The resulting increase of nitrates poses a potential threat to valuable agricultural lands as well as to the quality of the groundwater.

The San Joaquin Master Drain as presently planned would be about 280 miles in length and would have a capacity at its southern end of 60 cubic feet per

second (cfs) and a terminal capacity of 900 cfs. Some excess capacity is anticipated in the drain to provide for wastewaters which are high in nitrate and chloride content and are generated by non-agricultural concerns.

Fig VIII-2

TULARE COUNTY
WASTEWATER MANAGEMENT PLAN

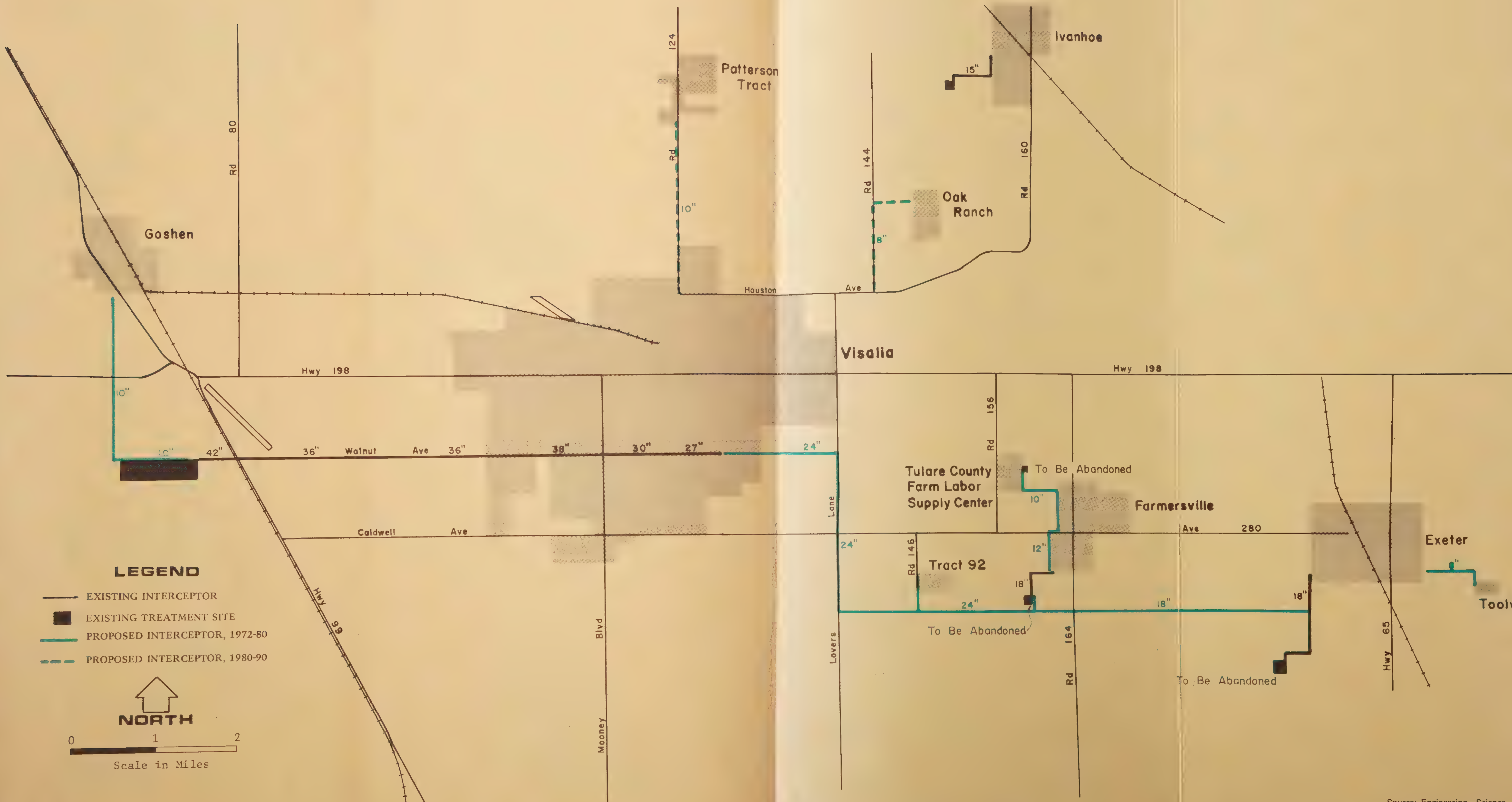


PREPARED BY:
TULARE COUNTY PLANNING DEPARTMENT
AUGUST, 1970 (WATER & LIQUID WASTE STUDY)

SOURCE: ENGINEERING-SCIENCE, INC.

Fig VIII-4

Joint Project Number 2



Source: Engineering - Science, Inc.

Fig. VIII-5

Joint Project Number 3

Source: Engineering - Science, Inc.

TULARE COUNTY WASTEWATER MANAGEMENT PLAN

The purpose of this section is to describe and delineate the recommended wastewater collection, treatment, and disposal facilities as they relate to individual communities within the planning area. A pictorial description of the Tulare County Wastewater Management Plan is shown on Figure VIII-2. Locations of proposed interceptors and wastewater treatment facilities for joint wastewater management projects are shown on Figures VIII-3, 4, and 5, and proposed treatment sites, interceptors, and trunk sewers for individual communities are shown on the Sewerage System Maps which were developed in conjunction with this report.

Communities to Remain on Septic Tanks

There are a number of communities within the planning area which for a number of reasons should continue to utilize septic tanks and leach fields as the method of sewage treatment and disposal. If unforeseen economic factors influence the anticipated growth in a given area or if public health problems result from the continued utilization of septic tanks, this recommendation should be modified accordingly. Possible contingency plans have been developed for some of these communities and are illustrated on Figure VIII-2.

Joint Project Number 1

The existing Cutler-Orosi Treatment facility is recommended as the site of the treatment facility for Joint Project Number 1 as described in Table VIII-3 and on Figure VIII-3.

TABLE VIII-7

JOINT PROJECT NUMBER 1

Treatment Facility	Dischargers to Facility	Existing Institutional or Governmental Authority
Cutler-Orosi	Cutler	Public Utility District
	East Orosi	Community Service District
	Midway	Property Owners Association
	Orosi	Public Utility District

The service area of this facility should be expanded to include the community of East Orosi and the area near Albert and Avenue 412 known as Midway. This expansion may be accomplished by the construction of an interceptor from East Orosi through Midway to the existing 15 inch line in Road 124 as shown on Figure VIII-3. Because the flows from this interceptor, when combined with the flow from Orosi and Cutler, would surcharge the existing interceptor to the plant, it is recommended that the interceptor from Orosi be rerouted along Avenue 408. Service could then be extended to the residential and industrial developments along Avenue 408. Additional trunk sewer elements are proposed along Road 124 in Orosi.

Expansion of existing facilities to provide for future growth in Cutler and Orosi is being considered at the present time (Reference VIII-1), and it is

recommended that capacity be incorporated into this future expansion to provide for the additional flows generated in East Orosi and Midway.

London

The sewerage facilities for the community of London appear to be adequate for service through the year 1990. The recent construction of new facilities will provide for the existing population which is not projected to change substantially. If, however, growth occurs in excess of that which is anticipated, it is recommended that the construction of primary facilities be investigated to provide some solids removal and decomposition prior to discharge to the aerated ponds.

Traver

Existing problems with septic tank filter fields present a possible public health problem in this area. Past attempts to secure financial assistance to aid in constructing sewerage facilities to relieve this problem have been unsuccessful. Considering existing conditions and the projected increase in population, it is recommended that sewerage facilities be constructed to alleviate the problems associated with septic tank failures. Due to the small population, it is recommended that the treatment facility be limited to a package plant with ponds being used for final polishing of the effluent and for disposal by evaporation and percolation.

SUB-PLANNING AREA B

Joint Project Number 2

The existing treatment facility which serves the City of Visalia is recommended to become the regional wastewater treatment facility for Joint Project Number 2. The nine communities indicated in Table VIII-4 could be served by the construction of interceptors which would connect to the existing City of Visalia system as shown on Figure VIII-4.

TABLE VIII-8

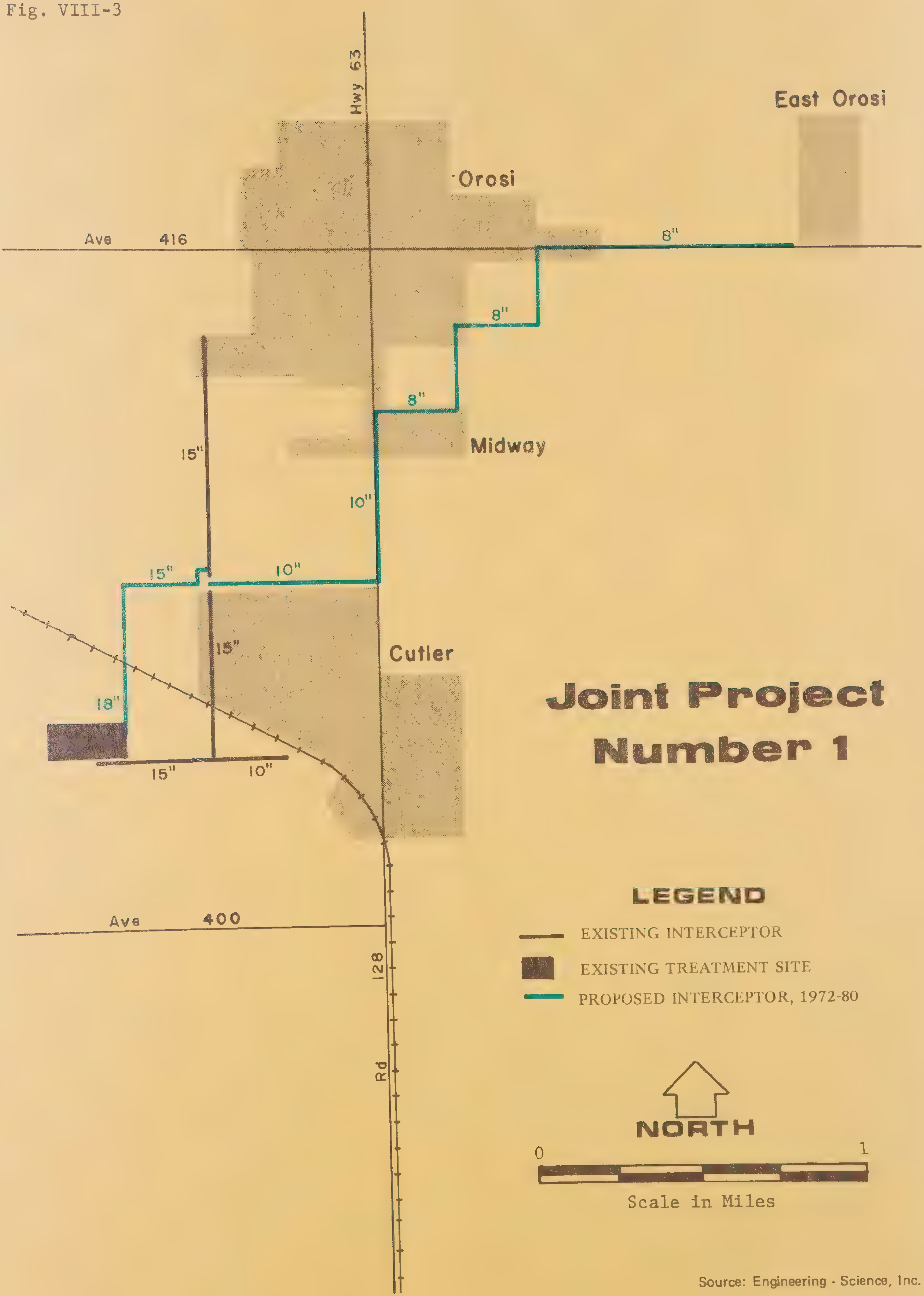
JOINT PROJECT NUMBER 2

Treatment Facility	Dischargers to Facility	Existing Institutional or Governmental Authority
City of Visalia	Exeter	City
	Farmersville	City
	Goshen	Community Service District
	Linnell Farm Center	County Housing Authority
	Oak Ranch	(a)
	Patterson Tract	Community Service District
	Tooleville	(a)
	Visalia	City
	Tract 92	Community Service District

(a) No institutional or governmental authorities exist.

The construction of an interceptor along Road 68 down to Avenue 286 and then along Avenue 286 to the existing treatment facility would provide service to the community of Goshen. The Patterson Tract area could be serviced by an interceptor along State Highway 63 from Avenue 320 to the existing Visalia system, and the Oak Ranch area could be serviced by a connecting sewer after completion of a proposed trunk sewer from Santa Fe Avenue to Road 144 by the City of Visalia.

Fig. VIII-3



Source: Engineering - Science, Inc.

The construction of an interceptor from Belmont Avenue south of the City of Exeter, to the Visalia trunk system at the intersection of Santa Fe and Walnut would provide service to several areas. Discharges to this interceptor would be from Tract 92, the City of Farmersville and the Tulare County farm labor center at Linnell, the Cameron Creek area if the current growth trend continues, and the community of Tooleville.

The close proximity of Tooleville to the City of Exeter and the relative density of existing development provide sufficient justification for recommending that this area be sewered. The construction of an interceptor along 14th Avenue to Firebaugh Avenue and then along Firebaugh Avenue to the existing City of Exeter collection system would provide adequate service to the community of Tooleville in addition to providing service for proposed commercial development along Highway 65.

Considering the condition of portions of the City of Exeter's treatment facility and the fact that they are near capacity, it is recommended that Exeter abandon its treatment facility and connect to the regional interceptor. The additional flow from Tooleville would bring the existing treatment facility to capacity and would require the construction of expanded facilities in addition to the replacement of existing facilities which are in a deteriorated condition.

The continued use of septic tanks in the Tract 92 area poses a potential threat to the quality of the groundwater due to a high groundwater table. For this reason and considering the proximity of Tract 92 to the regional interceptor, it is proposed that this area be sewered and a trunk line be placed in Mariposa Avenue connecting to the interceptor.

Due to the present condition of the Linnell Farm Center's treatment facility and an expanded growth pattern within the Center, it is recommended that the

existing treatment facilities be abandoned and that an interceptor be constructed such that it would have an alignment through the westerly portion of Farmersville where it could also be utilized as a trunk sewer. In the interim period before this interceptor becomes a reality, it is recommended that a recirculation box be placed on the trickling filter so that the filter can maintain a more substantial bacterial growth to adequately treat the sewage.

Problems associated with the disposal of effluent are being experienced by the City of Farmersville at the present time (Reference VIII-2). The cost of additional land for the construction of additional ponds is very high and almost prohibitive. Additonal ponds could be constructed by removing portions of the existing orchards and this is recommended as a short-term measure. As a long-term solution to the problem, however, it is recommended that the City tie into the interceptor to Visalia.

Ivanhoe

The existing sewerage facilities have reasonably adequate capacity to serve the community of Ivanhoe, however, some long-range modifications will be required prior to 1990. It is recommended that a separate system for the collection and disposal of storm waters be constructed to eliminate the overloading of the plant during storm conditions and to prevent excessive scour of the collection system and pumping facilities caused by the excess grit washed in by the storm waters.

Lemon Cove

In order to reduce the potential for a public health and/or a pollution problem, it is strongly recommended that sewage treatment facilities be constructed for the community of Lemon Cove. The potential for beneficial reuse of the effluent is high and the treatment facility should produce an

effluent which would encourage its reuse. The existing population places constraints upon the type of treatment plant which can be utilized and in order to produce an acceptable effluent, a package plant is recommended. Proper disinfection of the effluent should take place in ponds prior to discharge to irrigation.

Woodlake

An existing report by George E. Chrissakis for the City of Woodlake (Reference V-1) outlines proposed facilities for the City. Specific recommendations for treatment plant facilities are proposed and it is recommended as part of this waste water management plan that they be implemented at the earliest possible date. Proposed facilities include a new lift station, clarifier, recording flow meter, digester, aeration cells, and additional sludge beds. Although the proposed facilities are in keeping with the county-wide plan, serious consideration should be given to providing a more advanced level of secondary treatment than is proposed by the consultant of the City of Woodlake.

SUB-PLANNING AREA C

Tract 104

Provision of sewerage facilities for the Tract 104 area has been recommended in the Laspina-Levin Sewer Project for the City of Tulare (Reference VIII-3). This project was initiated to provide a planned basis for the expansion of sewage collection service to the southern portion of the Tulare metropolitan planning area. Preliminary designs for the trunk sewer along Paige Avenue have been completed and due to the extent of existing development in Tract 104, it is recommended that the construction of the Paige Avenue trunk sewer and necessary interconnecting facilities be implemented at the earliest possible date.

Lindsay Municipal

The construction of several facilities are recommended in the short-term for the City of Lindsay. The surcharged condition of the interceptor has necessitated the sealing of several manhole covers thus preventing any maintenance of the line (Reference V-5). The line was originally constructed at less than minimum slope thus preventing adequate velocities to keep grit and organic matter in a suspended state. It is therefore recommended that a new interceptor be laid to the headworks of the treatment facility and that new headworks facilities be constructed consisting of a lift station, comminution and grit removal facilities, and the relocated automatic sampler. It is also recommended that a pipeline be laid to convey the effluent from the clarifier to the ponds.

Prior to 1980 additional treatment facilities should be constructed including a new clarifier and digester with consideration being given to the design of secondary treatment facilities which would produce an effluent with increased beneficial reuse potential.

Lindsay-Industrial

A report to the Consolidated Olive Growers concerning the industrial waste treatment process has been submitted by Metcalf & Eddy Consulting Engineers (Reference VIII-4). This report involved an in-depth evaluation of the existing characteristics of the industrial liquid waste and evaluated alternative methods of treating the wastewaters. The recommendations of the report included the following: (1) the installation of mechanical aerators in the first pond to assist in decomposing the organic load, (2) provisions for the recirculation of wastewater between ponds, and (3) the construction of more

lined ponds as needed. Pretreatment by screening was also mentioned and the use of a screen finer than 20 mesh was recommended. These recommendations should be implemented in the near future.

Additionally, investigations should be conducted into methods of reducing the amount of wastewater discharged to the ponds. At the present time, the Department of Water Resources is investigating the desalinization of agricultural wastewaters with chloride contents up to 1,000 mg/l. A modified reverse osmosis process is being utilized, as designed by engineers at the University of California at Los Angeles. The results of these pilot plant tests should be considered to determine the feasibility for utilization of this process in Lindsay.

Strathmore

Considering the relative quantities and characteristics of the industrial liquid wastes generated within the community, it is recommended that strict enforcement of existing pretreatment policies be implemented. If the policy of sedimentation of high inorganic solids loadings were to be enforced prior to discharge to the collection system, in addition to the equalization of industrial wastewater flows, sufficient capacity would be available to treat projected future flows. The only expenditures (by the P.U.D.) that may be anticipated would be for the repair and maintenance of existing facilities and for trunk sewer additions within the community.

SUB-PLANNING AREA E

Earlimart

The existing treatment facilities which serve the community of Earlimart appear to have adequate capacity to serve the community until 1990; however, in-plant process modifications may be required prior to that time. In the near future, it is anticipated that it will be necessary to provide comminutor blades with closer tolerances to prevent the passing of rags and other solids which have caused pump failures and clogging of portions of the system in the past. The provision of a concrete block wall to replace the fence wall on the trickling filter should be investigated to avoid the necessity of taking the filter out of service periodically to build a new fence.

Pixley

The existing treatment facilities which serve the service area of the Pixley Public Utility District have adequate capacity to properly treat the sewage through the year 1990. It is recommended, however, that a more adequate program of maintenance be undertaken in order to prevent the deterioration of the existing facilities. The provision of a mechanically cleaned bar screen might enhance the cleanliness of the plant and prevent the large amounts of floating matter evidenced at the time of the field inspection.

Tipton

As with Pixley, the existing treatment facilities which serve the community of Tipton appear to be adequate through the year 1990. An adequate maintenance program is required, however, to prolong the useful life of the existing facilities. In the event that more industry locates in Tipton or the Arden milk processing plant increases its wastewater flow, an evaluation

of the remaining plant capacity should be made in order to determine the necessity of constructing additional facilities.

Joint Project Number 3

The existing Woodville treatment facility should be expanded as required to receive flows from the communities included in Joint Project Number 3 as described in Table VIII-5 and on Figure VIII-5.

Although the communities of Poplar and Cotton Center are not expected to increase in population, the present development is extensive enough to justify interconnecting these communities with the Woodville Farm Center and Woodville.

The deteriorated and inoperable condition of the treatment and disposal facilities which serve the Woodville Farm Center substantiate the recommendations to abandon these facilities and the recommended interconnection with the interceptor to Woodville.

TABLE VIII-9

JOINT PROJECT NUMBER 3

Treatment Facility	Dischargers to Facility	Existing Institutional or Governmental Authority
Woodville	Woodville	Public Utility District
	Woodville Farm Center	County Housing Authority
	Cotton Center	None exists
	Poplar	Community Service District

In order to insure adequate capacity for future flows, more express standards for industrial discharges are required in the community of Woodville. The in-plant screening of process wastewaters would prevent pump clogging and would

reduce the total organic load to the treatment plant. In addition, because wash down water from loading pads at the dehydration plant and storm water entering these same drains result in excessive hydraulic loadings at the treatment plant, these flows (low in BOD) should be disconnected from the sanitary sewerage collection system and treated separately.

SUB-PLANNING AREA F

Richgrove

Due to the increasing development in the community of Richgrove and existing problems with septic tanks (Reference V-10), it is recommended that community sewerage facilities be provided for this area. The extent of both residential and commercial development suggest that secondary treatment facilities be considered as a minimum. Beneficial reuse potential for effluent is high and it should be well accepted at times when excess irrigation waters are not available. A possible treatment site and recommended collection system are presented on the sewerage system map.

Terra Bella

Construction of new facilities to serve the Terra Bella Sewer Maintenance District is scheduled to begin in the near future (Reference VIII-5). The treatment system will include aerated lagoons and evaporation-percolation ponds. Considering the depth to groundwater and existing soil structure conditions in the area, it appears that the proposed method of treatment will not cause serious degradation of the groundwater. It is recommended, however, that the facilities be designed with sufficient acreage and flexibility of layout such that appropriate modifications may be constructed in the future to achieve more advanced levels of treatment.

Tract 213

The Porterville Master Sewerage Plan (Reference VIII-6) proposes the construction of sewerage facilities for the western portion of the Porterville Urban Area, including Tract 213. It is therefore recommended that construction of the required trunk elements to serve this area be implemented in accordance with the Porterville Master Sewerage Plan.

SUB-PLANNING AREA G

Camp Nelson

Considering the relative density of development in the area and in order to protect existing water supply systems, it is recommended that sewage collection, treatment, and disposal facilities be provided. The presence of a thick soil mantle suggests that some "hard to sewer" fringe areas may remain on septic tanks. The treatment facility should provide a minimum of secondary treatment with serious consideration and investigation being given to the construction of tertiary facilities. Disposal of the effluent would likely be to evaporation-percolation ponds.

Springville

It is recommended that construction of additional facilities to increase the capacity of the existing sewage treatment system be implemented as described in Chapter V.

Alternative A THREE RIVERS AREA

Figure VIII-6

Prepared By: Tulare County Planning Department
Source: Engineering - Science, Inc.

Alternative B THREE RIVERS AREA

Figure VIII-7

Prepared By: Tulare County Planning Departmnet
Source: Engineering - Science, Inc.

Alternative C THREE RIVERS AREA

Figure VIII-8

Prepared By: Tulare County Planning Department
Source: Engineering - Science, Inc.

SUB-PLANNING AREA H

Three Rivers Area

In order to support anticipated future growth, to alleviate existing public health hazards caused by septic tank failures (Reference V-10), and to improve the overall quality of water provided by existing water supply systems, it is recommended that wastewater collection and treatment facilities be constructed to service the Three Rivers Area. Based on preliminary analysis, three feasible alternatives have been developed. The alternative schemes are illustrated on Figures VIII-6, VIII-7, and VIII-8.

Alternative A:

This alternative proposes to consolidate the wastewater at one treatment location as shown on Figure VIII-6. Effluent would be contained in the Three Rivers Area for possible watering of crops, forest areas, the golf course, and other recreational areas. Because of this containment, it is anticipated that treatment processes will be required to achieve high BOD and COD removal efficiencies and, eventually, removal of nitrates, phosphates, and color and odor. Consolidation of the wastewater at one location offers economy of scale in the construction of these costly treatment facilities.

Alternative B:

The collection system proposed in Alternative B (Figure VIII-7) is exactly the same as for Alternative A. Wastewater is proposed to be consolidated at approximately the same location as for Alternative A, but is then discharged out of the Kaweah River Basin to a secondary wastewater treatment facility located in the Dry Creek Basin downstream of Terminus Dam.

Alternative C:

A more localized approach to wastewater management in the Three Rivers Area is offered by Alternative C. Three wastewater treatment facilities are located as shown on Figure VIII-8 such as to minimize pumping and trunk sewer requirements. It is anticipated that some form of tertiary treatment would be required at each of these treatment locations, and that the combined cost of the three treatment plants would be considerably higher than for the single plant considered in Alternative A.

COSTS OF RECOMMENDED WASTEWATER FACILITIES

Estimated capital costs for all facilities recommended in the wastewater management plan are enumerated in Table VIII-6, and a comparative cost analysis of alternatives for the Three Rivers Area is presented in Table VIII-7. The cost estimating basis as presented in Chapter VII was used in determining the indicated costs. In order to provide a common basis of comparison, all costs were calculated on the basis of 1971 prices and should be adjusted according to the projected ENR Index to determine future funding requirements.

RECOMMENDED WASTEWATER MANAGEMENT PLAN

1. The wastewater management plan recommended for Tulare County was developed to achieve the following objectives: (1) protection of public health, (2) balance of environmental ecology, and (3) maximum reclamation of water resources.

2. Although most existing disposal systems achieve reclamation of wastewaters via percolation to the groundwater system or by irrigation, because of present limitations in the degree of treatment, increasing quantities of undesirable constituents are being discharged to the groundwater basin. Continued protection of the groundwater resource may be partially achieved by reducing the number of treated wastewater locations and by accomplishing more advanced treatment methodology in those selected locations than is presently the case. Further, economy of scale in the construction of sophisticated treatment facilities may often be achieved by consolidating systems.

3. The Tulare County Wastewater Management Plan recommends the construction of three joint projects involving seventeen communities, the construction of collection and treatment facilities for several areas in which septic tanks are posing a potential threat to the quality of the groundwater and to the health of the community, and presents three alternative plans for the provision of sewerage facilities for the Three Rivers Area. The wastewater management plan is shown on Figure VIII-2. Table IX-2 lists the recommended projects, a brief description of the project, recommended period of construction, and the estimated initial capital cost for providing the recommended facilities.

4. With the exception of Lindsay, all of the recommended systems assume that most industrial wastewaters will ultimately be discharged to municipal systems. Communities receiving industrial wastewaters should consider adoption of wastewater discharge ordinances including limiting parameters for average daily flow, BOD_5, suspended solids, pH, grease content, toxic substances, and other constituents which are not economically treatable in municipal systems. Under these discharge ordinances, industrial wastewaters would be treated at the source until the effluent is within above established parameters for discharge to the municipal system.

5. When construction is completed, the San Joaquin Master Drain Project may provide a possible method of disposal for some non-reclaimable wastewaters. Some excess capacity is anticipated in the drain to provide for wastewaters which are high in nitrate and chloride content and are generated by non-agricultural entities.

TABLE VIII-10

SUMMARY OF CAPITAL COSTS
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA A		
JOINT PROJECT NUMBER 1		
Interceptor	27,000	
E & C (a)	6,800	
Total Capital Cost	$ 33,800	
CUTLER-OROSI		
Trunk Sewers	335,500	16,500
Treatment and Disposal	240,000 (b)	
E & C	143,900	4,100
Total Capital Cost	$719,400	$20,600
EAST OROSI		
Trunk Sewers	74,100	
E & C	18,500	
Total Capital Cost	$ 92,600	
TRAVER		
Interceptor	13,600	
Trunk Sewers	114,000	
Pumping Station	10,000	
Treatment and Disposal	49,000	
E & C	46,700	
Cost of Lands	10,000	
Total Capital Cost	$243,300	
SUB-PLANNING AREA B		
JOINT PROJECT NUMBER 2		
Treatment and Disposal	950,000 (c)	
Interceptor	1,439,400	
E & C	597,400	
Total Capital Cost	$2,986,800	

TABLE VIII-10 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA B (Continued)		
EXETER		
Trunk Sewers	226,500	
E & C	56,600	
Total Capital Cost	$283,100	
FARMERSVILLE		
Interceptor	9,400	
Trunk Sewers	112,200	
E & C	30,400	
Total Capital Cost	$152,000	
GOSHEN		
Interceptor	265,700 (d)	
Trunk Sewers	227,400	
E & C	123,300	
Total Capital Cost	$616,400	
LEMON COVE		
Interceptor	14,500	
Trunk Sewers	103,500	
Pump Station	8,000	
Treatment and Disposal	44,000	
E & C	42,500	
Cost of Lands	14,000	
Total Capital Cost	$226,500	
LINNELL FARM CENTER		
Interceptor	95,300	
E & C	23,800	
Total Capital Cost	$119,100	

TABLE VIII-10 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA B (Continued)		
PATTERSON TRACT		
Interceptor		195,900 (d)
Trunk Sewers		226,600
E & C		105,600
Total Capital Cost		$528,100
OAK RANCH		
Interceptor		108,700 (d)
Trunk Sewers		81,500
E & C		47,600
Total Capital Cost		$237,800
TOOLEVILLE		
Interceptor	30,600 (e)	
Trunk Sewers	47,800	
E & C	19,600	
Total Capital Cost	$ 98,000	
WOODLAKE		
Interceptor	22,300	52,400
Trunk Sewers	175,300	194,700
Treatment and Disposal	470,000	150,000 (f)
E & C	166,900	99,300
Total Capital Cost	$834,500	$496,400
TRACT 92		
Interceptor	16,300	
Trunk Sewers	69,800	
E & C	21,500	
Total Capital Cost	$107,600	

TABLE VIII-10 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA D		
LINDSAY-MUNICIPAL		
Interceptor	397,400	
Trunk Sewers	171,700	138,300
Pump Stations		16,000
Treatment and Disposal	1,625,000	
E & C	548,500	38,600
Total Capital Cost	$2,742,600	$192,900
LINDSAY-INDUSTRIAL		
Treatment and Disposal	52,700 (g)	(h)
E & C	13,200	
Total Capital Cost	$ 55,900	
STRATHMORE		
Trunk Sewers	14,700	11,500
Treatment and Disposal		80,000 (f)
E & C	3,700	22,900
Total Capital Cost	$ 18,400	$114,400
SUB-PLANNING AREA E		
EARLIMART		
Trunk Sewers	33,300	
Treatment and Disposal		50,000 (f)
E & C	8,300	12,500
Total Capital Cost	$ 41,600	$ 62,500
PIXLEY		
Trunk Sewers	36,600	9,800
Treatment and Disposal		52,000 (f)
E & C	9,200	15,500
Total Capital Cost	$ 45,800	$ 77,300

TABLE VIII-10 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	1980-90
SUB-PLANNING AREA E (Continued)		
JOINT PROJECT NUMBER 3		
Interceptor	419,300	
Pump Station	20,000	
Treatment and Disposal	108,000 (i)	80,000 (f)
E & C	136,800	20,000
Total Capital Cost	$684,100	$100,000
COTTON CENTER		
Trunk Sewers	45,100	
E & C	11,300	
Total Capital Cost	$ 56,400	
POPLAR		
Trunk Sewers	166,600	
E & C	41,700	
Total Capital Cost	$208,300	
WOODVILLE FARM CENTER		
Interceptor	15,000	
E & C	3,800	
Total Capital Cost	$ 18,800	
SUB-PLANNING AREA F		
RICHGROVE		
Interceptor	16,700	
Trunk Sewers	145,400	21,400
Pumping Station	20,000	
Treatment and Disposal	112,000	
E & C	73,500	5,400
Cost of Lands	20,000	
Total Capital Cost	$387,600	$ 26,800

TABLE VIII-10 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80		Capital Costs (1) 1980-90	
SUB-PLANNING AREA F (Continued)				
TERRA BELLA				
Interceptor	31,600			
Trunk Sewers	217,600			
Treatment and Disposal	30,700		44,000	(f)
E & C	70,000		11,000	
Total Capital Cost	$349,900		$ 55,000	
SUB-PLANNING AREA G				
CAMP NELSON				
Trunk Sewers	208,000		44,200	
Pumping Station	22,000			
Treatment and Disposal	158,500			
E & C	97,100		11,100	
Cost of Lands	20,000			
Total Capital Cost	$505,600		$55,300	
SPRINGVILLE				
Trunk Sewers	101,600	(j)		
Treatment and Disposal	20,000		20,000	
E & C	30,400		5,000	
Cost of Lands	4,000		4,000	
Total Capital Cost	$156,000		$29,000	
SUB-PLANNING AREA H				
THREE RIVERS				
Alternative A (Single Plant)				
Trunk Sewers	1,096,000	(j)	690,000	
Treatment and Disposal	800,000	(k)		
Pumping Stations	70,000		12,000	
E & C	492,000		176,000	
Cost of Lands	70,000	(1)		
Total Capital Cost	$2,528,000		$878,000	

TABLE VIII-10 (Continued)

SUMMARY OF CAPITAL COSTS
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

Community and Description of Cost Item	Capital Costs (1) 1972-80	Capital Costs (1) 1980-90
SUB-PLANNING AREA H (Continued)		
THREE RIVERS (Continued)		
Alternative B (Out of Basin)		
Interceptor	1,580,000 (m) (j)	
Trunk Sewers	1,096,000 (j)	690,000
Treatment and Disposal	430,000	
Pumping Stations	70,000	12,000
E & C	794,000	176,000
Cost of Lands	8,000	
Total Capital Cost	$3,978,000	$878,000
Alternative C (3 Plants)		
Trunk Sewers	1,030,000 (j)	690,000
Treatment and Disposal	1,110,000 (k)	
Pumping Stations	38,000	12,000
E & C	545,000	176,000
Cost of Lands	110,000 (l)	
Total Capital Cost	$2,833,000	$878,000

(1) 1971 cost basis (ENR = 1500).

(a) Engineering and contingencies.
(b) From Reference VII-1. Provides sufficient capacity for Joint Project Number 1.
(c) Provides for necessary expansion of Visalia treatment facility.
(d) Connection to Visalia treatment plant or collection system.
(e) Connection to Exeter system.
(f) Treatment plant expansion or modification.
(g) From Reference VIII-4 (adjusted to 1971 prices).

(h) An in-depth study to evaluate alternative reclamation schemes is recommended.
(i) Provides for necessary expansion of Woodville treatment facility.
(j) Pipeline cost increased from 10 to 100 percent to allow for unusual excavation and construction conditions.
(k) Includes tertiary treatment.
(l) Assumes cost of land at $5,000 per acre.
(m) Includes cost of main pumping station with standby generator.

TABLE VIII-11

COMPARATIVE COST ANALYSIS

THREE RIVERS AREA

Alternative A (Single Plant)

Initial Capital Cost	$2,528,000	
Less Federal and State Funding (1)	856,000	
Subtotal	$1,672,000	
Annual Amortized Cost (2)		$121,500
Annual O & M Cost of Conventional Treatment (3)		7,400
Annual O & M Cost of Advanced Treatment		10,900
Annual O & M Cost of Collection Facilities (4)		4,500
Total Annual Cost		$144,300
Annual Cost per Family (5)		$360

Alternative B (Out of Basin)

Initial Capital Cost	3,978,000	
Less Federal and State Funding (1)	2,016,000 (6)	
Subtotal	$1,962,000	
Annual Amortized Cost (2)		$142,500
Annual O & M Cost of Conventional Treatment		7,400
Annual O & M Cost of Collection Facilities (4)		6,500
Total Annual Cost		$156,400
Annual Cost per Family (5)		$390

Alternative C (3 Plants)

Initial Capital Cost	2,833,000	
Less Federal and State Funding (1)	1,198,000	
Subtotal	$1,635,000	
Annual Amortized Cost (2)		118,800
Annual O & M Cost of Conventional Treatment		8,600
Annual O & M Cost of Advanced Treatment		13,700
Annual O & M Cost of Collection Facilities (4)		1,300
Total Annual Cost		$142,400
Annual Cost per Family (5)		$356

(1) Assumes 80 percent financing for fundable facilities (55 percent from EPA funds and 25 percent from State Clean Water Grant).
(2) Capital cost amortization at 6 percent interest for 30 years.
(3) Annual operation and maintenance costs (O & M).
(4) Includes annual O & M cost of pumping stations.
(5) Based on an assumed 400 permanent families residing in the Three Rivers Area.
(6) Assumes funding of Class B Interceptor.

NOTE: Assumes maximum federal funding. Does not include all laterals -- these would add $25.00 per year per family. Does not include Washburn Cove and Hammond. Does not include individual hook-up charges.

CHAPTER NINE

FINANCING AND PLAN IMPLEMENTATION

CHAPTER IX

FINANCING AND PLAN IMPLEMENTATION

INTRODUCTION

Implementation of the recommended water supply and wastewater management plans will generally involve consideration of the following procedural elements: (1) allocation of funding responsibility, (2) determination of funding capacity and evaluation of alternative methods of financing, (3) establishment of priorities for construction, and (4) development of specific policies and programs for implementation. For a particular project, each of these procedures may require resolution to a more or lesser extent, and the sequence of consideration should be suited to the project. The purpose of this chapter is to discuss the aforementioned procedures as they relate to the recommended plans and specific projects thereof.

ALLOCATION OF FUNDING RESPONSIBILITY

General

Virtually all cost allocation programs fundamentally utilize a benefits basis of one form or another. Benefits normally considered are: (1) specific or direct benefits from the provision of services, and (2) general benefits resulting from improvement in water quality and in preserving the general environment of the planning area. The specific beneficiaries are those entities (including people, industries, commercial establishments, etc.) served by a particular utility district; the general beneficiaries are all of the people (including industrial, commercial, and other interests) residing in an area. The costs which may be identified with direct and indirect benefits must be determined on an individual basis for each project.

Single Community Systems

The project costs for single community systems are normally allocated on a direct benefit basis. Benefiting entities within an assessment district are normally assessed on the basis of number of connections, frontage, acreage, or a combination thereof, depending upon the type of service to be provided.

Inter-Community Systems

The joint wastewater management projects presented in Chapter VIII will require a cooperative funding effort involving two or more communities and possibly Tulare County. Upon completion of these joint projects, both the county and the individual communities will receive indirect benefits in terms of reduced numbers of septic tank systems and increased potential for development in the outlying portions of established communities.

The basis for Joint Project Number 1 has been previously established by the consolidation of treatment and disposal facilities for the communities of Cutler and Orosi. Joint Project Number 1 proposes to expand and improve upon the existing system. Joint Project Number 2 represents a natural extension of the existing Visalia system, and Joint Project Number 3 offers a means of providing sewerage facilities to four communities with minimum expenditure for treatment and disposal.

Expansion of existing treatment facilities to receive wastewaters from outlying communities may be paid for either on a user fee basis (determined by number of connections) or as a lump sum with contractural capacity being guaranteed to the outlying community. Often, both capital improvements and operation and maintenance costs are funded by accumulated user fees.

FUNDING CAPACITY OF COMMUNITIES

In order to assess the financial capability of the various communities with respect to anticipated costs, the bond funding capacity of each community was determined; this information is summarized in Table IX-1. A maximum bonding capacity of 20 percent of assessed valuation was assumed in all cases for which no statutory limits have been established.

A comparison of the cost of recommended facilities (as presented in Tables VIII-3 and VIII-4) with the bond funding capacity as determined in Table IX-1, provides an indication of the extent to which these communities may require supplementary financial assistance. Where federal or state assistance is potentially available, the ability of a community to provide matching funds may be determined by the bond funding capacity. Additional considerations for communities with limited funding capacity are provided in the last section of this chapter.

TABLE IX-1

FUNDING CAPACITY OF COMMUNITIES

Municipality, District, or Community	Present Service Provided		Assessed (1) Valuation ($000's)	Bonding (2) Capacity ($000's)	Present Bond Indebtedness ($000's)	Bond Funding Capacity ($000's)
	Water	Sewer				
Sub-Planning Area A						
Cutler	*	*	1,271.0 (a)	254.2	201.0	53.2
Delft Colony	-	-	74.4 (b)	14.9	-	14.9
East Orosi	*	-	N.A.	-	-	-
London	*	*	178.0 (a)	35.6	160.0	(d)
Monson	-	-	28.4 (b)	5.7	-	5.7
Orosi	*	*	1,737.6 (a)	347.5	333.0	14.5
Seville	*	-	40.3 (b)	8.1	-	8.1
Sultana	-	-	100.7 (b)	20.1	-	20.1
Traver	*	-	85.5 (b)	17.1	-	17.1
Yettem	-	-	55.7 (b)	11.1	-	11.1
Sub-Planning Area B						
Elderwood	-	-	56.8 (b)	11.4	-	11.4
Exeter	*	*	6,355.3 (a)	1,271.1	-	1,271.1
Farmersville	*	*	1,961.1 (b)	392.2	490.0	(d)
Goshen	*	-	568.7 (b)	113.7	-	113.7

TABLE IX-1 (Continued)

FUNDING CAPACITY OF COMMUNITIES

Municipality, District, or Community	Present Service Provided: Water	Present Service Provided: Sewer	Assessed (1) Valuation ($000's)	Bonding (2) Capacity ($000's)	Present Bond Indebtedness ($000's)	Bond Funding Capacity ($000's)
Ivanhoe	*	*	1,739.3 (a)	347.9	135.4	212.5
Lemon Cove	*	*	121.9 (b)	24.4	-	24.4
Lindcove	*	-	32.5 (a)	6.5	-	6.5
Patterson Tract	*	-	183.6 (b)	36.7	-	36.7
Oak Ranch	*	-	408.3 (b)	81.7	-	81.7
Tooleville	-	-	50.6 (b)	10.1	-	10.1
Woodlake	*	*	2,323.2 (a)	464.6	-	464.6
Tract 92	*	-	118.7 (b)	23.7	-	23.7
Sub-Planning Area C						
Waukena	-	-	34.7 (b)	6.9	-	6.9
Tract 51	-	-	43.2 (b)	8.6	-	8.6
Tract 104	*	-	155.0 (b)	31.0	-	31.0
Sub-Planning Area D						
Lindsay	*	*	11,000.0 (a)	2,200.0	440.0 (c)	1,760.0
Plainview	*	-	228.2 (b)	45.6	-	45.6

TABLE IX-1 (Continued)

FUNDING CAPACITY OF COMMUNITIES

Municipality, District, or Community	Present Service Provided		Assessed (1) Valuation ($000's)	Bonding (2) Capacity ($000's)	Present Bond Indebtedness ($000's)	Bond Funding Capacity ($000's)
	Water	Sewer				
Strathmore	*	*	1,185.9 (b)	237.2	9.0	228.2
Tonyville	*	-	27.0 (b)	5.4	-	5.4
Sub-Planning Area E						
Allensworth	*	-	3.3 (b)	0.7	-	0.7
Alpaugh	*	-	116.5 (b)	23.3	-	23.3
Earlimart	*	*	2,038.0 (a)	407.6	240.0	167.6
Pixley	*	*	1,454.1 (a)	290.8	-	290.8
Teviston	*	-	176.1 (b)	35.2	-	35.2
Tipton	*	*	1,391.2 (a)	278.2	-	278.2
Woodville	*	*	770.3 (a)	154.1	261.5	(d)
Sub-Planning Area F						
Cotton Center	*	-	147.2 (b)	29.4	-	29.4
Ducor	*	-	122.6 (b)	24.5	-	24.5
Poplar	*	-	329.5 (b)	65.9	-	65.9
Richgrove	*	-	368.1 (b)	73.6	-	73.6

TABLE IX-1 (Continued)

FUNDING CAPACITY OF COMMUNITIES

Municipality, District or Community	Present Service Provided		Assessed (1) Valuation ($000's)	Bonding (2) Capacity ($000's)	Present Bond Indebtedness ($000's)	Bond Funding Capacity ($000's)
	Water	Sewer				
Terra Bella	*	*	370.0 (a)	74.0	-	74.0
Tract 213	*	-	311.2 (b)	62.2	-	62.2
Sub-Planning Area G						
Camp Nelson	*	-	N.A.	-	-	-
Springville	*	*	680.6 (b)	136.1	168.0	(d)
Sub-Planning Area H						
Three Rivers	*	-				
Tract 107	*	-				

(1) Assessed Valuation from indicated source.
(2) Assumes limiting G.O. bond indebtedness is 20 percent of assessed valuation.

(a) From Tulare County Liquid Waste Questionnaire.
(b) From Tulare County Planning Commission as reported in Chapter II.
(c) Bond being retired by Consolidated Olive Growers.
(d) Present bond indebtedness exceeds indicated G.O. bonding capacity.

ALTERNATIVE METHODS OF FINANCING

This section includes a brief outline of the alternative methods of local financing, and generally describes the programs for acquisition of supplemental funding from federal and state agencies.

LOCAL FUNDING

General Obligation Bonds

The general obligation bond is the method most widely used by public entities to finance improvements which are considered to be of general benefit to a region as a whole. They are primarily secured by and payable from ad valorem taxes levied on all taxable properties within the jurisdiction of the issuing entity. General obligation bonds represent the highest type of credit that a public entity can issue, and, as a result, they can normally be sold at lower interest rates than other types of bonds. The low interest rates stem from the fact that bonds are backed by the public agencies' total assets and the interest payments are not subject to Federal income tax. In most cases, the final maturity date must not exceed 40 years from the date of issuance, and the interest generally cannot exceed six percent per annum. The principal advantages of financing by issuance of general obligation bonds can be summarized as follows: (1) lower interest, (2) lower annual cost to meet principal and interest payments compared with other types of bonds, and (3) greater flexibility in raising funds.

Revenue Bonds

The revenue bond is another method which may be used by an entity to finance major facilities when an adequate method of levying and collecting service charges to secure payments of the bonds can be developed. As distinct from general obligation bonds, payments of revenue bonds are secured solely by the revenues derived from or as a result of the improvements constructed with

bond proceeds, and no property taxes may be used for their payment. This type of bond is becoming increasingly popular in California and elsewhere in the United States due to increasing difficulties faced by many communities and public agencies in attempting to finance a mounting number of services within their general obligation bonding capacity. There is no legal limit as to the amount of revenue bonds that may be issued; however, from a practical standpoint, and in order to make the bonds saleable, the principal amount of bonds so issued should be sufficiently small that the required annual principal and interest payments are less than the revenue available for bond service.

Major advantages of revenue bonds can be summarized as follows: (1) there is no legal limit on the amount of such bonds, (2) revenue bonds are payable solely from the revenues of the project and can never become a lien or charge against real property, and (3) payment of the bonds is derived solely from users of the facilities of the project for which the bonds were issued.

The disadvantages of such bonds are summarized as follows: (1) relative inflexibility in the management of the funds, (2) the interest rate is usually higher than for general obligation bonds, (3) owners of property not using the service pay nothing toward the bonds even though some indirect benefit may be received by such owners from the project financed by such bonds, (4) a reserve fund must be maintained as additional security for their payments, and (5) revenues to secure their payment should be at least 30 to 50 percent in excess of expected requirements.

Special Assessments

Special assessment districts are used primarily in limited areas in which the new works will be of local benefit only, but they are sometimes used for

broad-scale areas when the works are of benefit to the entire area of the agency. The resulting assessment bonds are short-term and, hence are not usually equitable for works which incorporate considerable extra capacity for future growth.

Special assessment bonds are financed by special assessments against each of the properties benefited. They are a more expensive means of financing than general obligation bonds because of the greater liabilities and because of the added legal assessment work. The individual assessments may be paid in cash in lieu of the short-term bonds indicated above.

FEDERAL ASSISTANCE

The programs of four agencies (the Environmental Protection Agency, Federal Water Quality Control Administration; Community Resources Development Administration of the Department of Housing and Urban Development; Farmers Home Administration of the Department of Agriculture; and Economic Development Administration of the Department of Commerce) provide loan and grant funds for the construction of water and sewerage system elements with the establishment of a system of preliminary inquiry review designed to eliminate duplication of funding and to provide expeditious processing of applications. Discussion related to the operations of these organizations is herein presented.

Environmental Protection Agency

The Federal Water Pollution Control Act, as amended, provides authorization for several types of aid programs for water pollution control. The most important of these programs for consideration here is under the control of the Environmental Protection Agency. Under this program the Federal Government provides funds to assist local public agencies in financing the construction of sewerage facilities. Projects are eligible for up to 55 percent of the construction cost, providing funds are available and that the project is in conformance with comprehensive region planning as provided in the Porter-Cologne Water Quality Control Act. Current state programs are directly integrated with this federal program to provide a grant potential of 80 percent of the total construction cost based upon the ability of the project to meet specified qualifications.

Department of Housing and Urban Development

Financial assistance for water supply and sewerage facilities is presently authorized by the Housing and Urban Development Act of 1965 (Public Law

89-117, Title VII). Section 702 of this program provides for grants up to 50 percent of the amount of construction costs for new water and sewerage facilities if projects meet specified criteria. The conditions under which this program is available to local public agencies include provisions that the project is (1) so designed that an adequate capacity will be available to serve the reasonably foreseeable growth needs of the area, (2) consistent with a program for an officially coordinated area-wide water facilities system as part of the comprehensively planned development of the area, and (3) necessary to the orderly development of the community.

Farmers Home Administration

Public or quasi-public agencies, including cooperatives, water districts, towns and other related organizations, which serve residents of open country and rural communities of not over 5,500 population, may receive financial and technical assistance from the Farmers Home Administration, Department of Agriculture. Public Law 89-240 authorized grant assistance to rural communities for use in developing water supply and waste-disposal facilities. The size of each grant is based on the amount necessary to reduce user costs to a reasonable level.

Funds may be used to install and improve: (1) works for the development, treatment, purification, and distribution of water (including wells, pipelines, pumping plants, and filtration and treatment equipment), and (2) facilities for the collection, treatment, and disposal of human, animal, and other wastes (including collection lines, treatment plants, outfalls, disposal fields, stabilization ponds, storm sewers, garbage trucks and equipment, incinerators, and sanitary land fills).

Each community applying for grant assistance is studied with regard to public health, pollution, and economic factors. It is intended that communities with the greatest need will receive first consideration for available loan and grant funds.

Economic Development Administration

The Economic Development Administration, Department of Commerce, was created (legislative authorization was signed into law 26 August 1965) to provide federal financial assistance to economically distressed areas to enable these areas to plan and finance effective development. The Economic Development Administration assistance includes grants to communities for public works projects and development facilities. Grants are generally available on a 50-50 sharing basis; but the law also provides that where areas are unusually depressed, the federal share may be increased to as much as 80 percent of the project cost. Projects must relate to creating new permanent jobs and improved income potential.

Assistance is also available in the form of long-term loans. Loans may be made for the same types of project as those provided for by grants. Loans for public works designed to improve industrial/commercial expansion possibilities may be made to public and nonprofit private organizations for up to 100 percent of project costs. Such loans may run for as long as 40 years.

STATE ASSISTANCE

Water Supply Facilities

Through the Davis-Grunsky Act (California Water Code Section 12880, et. seq.) the State of California can provide financial assistance to public agencies for the construction of water projects to meet local requirements. Under this program a project is eligible only if it substantially conforms to the California Water Plan, is engineeringly feasible, economically justified, and, if a loan is proposed, that there is reasonable assurance, commensurate with the need for the proposed project, that the public agency can repay it. Several types of loans can be available, some of which cover the capital construction costs of water treatment and supply facilities in addition to financing feasibility studies concerning the acquisition of interests in lands that are necessary for the construction, operation, or maintenance of proposed projects that would meet water needs of the public agency.

Sewerage Facilities

The State of California is authorizing grants of up to 25 percent of capital construction costs for portions of wastewater collection, treatment, and disposal facilities. This financial assistance was made available by the passage of the Clean Water Bond Act which provided for $250 million to be utilized as an incentive to allow for early construction of needed sewerage facilities; funds are to be totally allocated to projects initiated during the next five years. The program is a means of providing a base for feasible revenue programs in communities which have not been able to implement pollution abatement plans. A major consideration of the State's participation is that the design of new or expanded facilities be regional in nature.

Wastewater Management Priorities

A statement of priorities for the recommended wastewater facilities is presented in Table IX-2. Priorities have been established both in terms of the type of construction (project group) and anticipated period of construction. The estimated costs were extrapolated from Table VIII-4 and include engineering and contingencies. The cost of pump stations is included in the total cost of interceptors and trunk sewers.

Project Groups I and III conform to the classifications established by the State Water Resources Control Board in the "Clean Water Grant Program". Assuming sufficient state and federal monies are available, supplemental funding may be acquired for Project Groups I and III from the Environmental Protection Agency. Trunk sewers and appurtenances were classified into Project Group IV which is not included in the "Clean Water Grant Program". Nevertheless, supplemental funding for Project Group IV and other project groups may be available from sources other than the Environmental Protection Agency as described early in this chapter.

TABLE IX-2

STATEMENT OF PRIORITIES
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

City, Community, District, or Planning Area	Project Group (1)	Brief Description of Project (2)	Period of (3) Construction	Estimated Cost (4) (Dollars)
Sub-Planning Area A				
Joint Project No. 1	I	Class A Interceptor	1973-74	33,800
Cutler-Orosi	I	Treatment Plant Modifications	1974-75	300,000 (a)
	IV	Trunk Sewers	1972-90	440,000
East Orosi	IV	Trunk Sewers	1973-75	92,600
Traver	I	New Secondary Treatment Plant	1972-73	83,800
	III	Class B Interceptor	1972-73	17,000
	IV	Trunk Sewers	1972-80	142,500
Sub-Planning Area B				
Joint Project No. 2	I	Class A Interceptor	1974-75	1,799,300
	I	Treatment Plant Expansion	1974-75	1,187,500 (b)
Exeter	IV	Trunk Sewers	1972-90	283,100
Farmersville	I	Class A Interceptor	1974-75	11,800
	IV	Trunk Sewers	1972-90	140,200
Goshen	I	Class A Interceptor	1972-73	332,100
	IV	Trunk Sewers	1972-73	284,300
Lemon Cove	I	New Secondary Treatment Plant	1972-73	79,000
	III	Class B Interceptor	1972-73	18,100
	IV	Trunk Sewers	1972-90	129,400

TABLE IX-2 (Continued)

STATEMENT OF PRIORITIES
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

City, Community, District, or Planning Area	Project Group (1)	Brief Description of Project (2)	Period of (3) Construction	Estimated Cost (4) (Dollars)
Linnell Farm Center	I	Class A Interceptor	1974-75	119,100
Patterson Tract	I	Class A Interceptor	1975-80	244,900
	IV	Trunk Sewers	1975-80	283,200
Oak Ranch	I	Class A Interceptor	1980-90	135,900
	IV	Trunk Sewers	1980-90	101,900
Tooleville	I	Class A Interceptor	1973-74	38,300
	IV	Trunk Sewers	1973-74	59,700
Woodlake	I	Treatment Plant Modification	1972-73	
	I	Treatment Plant Expansion	1980-90	
	III	Class B Interceptors	1972-90	93,400
	IV	Trunk Sewers	1972-90	462,500
Tract 92	I	Class A Interceptor	1974-75	20,400
	IV	Trunk Sewers	1974-75	87,200
Sub-Planning Area D				
Lindsay-Municipal	I	Treatment Plant Modifications	1972-73	2,031,200
	II	Class B Interceptor	1972-73	496,800
	IV	Trunk Sewers	1972-90	407,500
Lindsay-Industrial	(c)	Treatment Plant Modifications	1972-74	55,900
Strathmore	I	Treatment Plant Modifications	1980-90	100,000
	IV	Trunk Sewers	1972-90	32,800

TABLE IX-2 (Continued)

STATEMENT OF PRIORITIES
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

City, Community, District, or Planning Area	Project Group (1)	Brief Discription of Project (2)	Period of (3) Construction	Estimated Cost (4) (Dollars)
Sub-Planning Area E				
Earlimart	I	Treatment Plant Improvements	1980-90	62,500
	IV	Trunk Sewers	1972-90	41,600
Pixley	I	Treatment Plant Modifications	1980-90	65,000
	IV	Trunk Sewers	1972-90	58,100
Joint Project Number 3	I	Class A Interceptor	1974-76	549,100
	I	Treatment Plant Modifications	1974-76	135,000
	I	Treatment Plant Improvements	1980-90	100,000
Cotton Center	IV	Trunk Sewers	1974-76	56,400
Poplar	IV	Trunk Sewers	1974-76	208,300
Woodville Farm Center	I	Class A Interceptor	1974-76	18,800
Sub-Planning Area F				
Richgrove	I	New Secondary Treatment Plant	1972-73	185,000
	III	Class B Interceptor	1972-73	20,900
	IV	Trunk Sewers	1972-90	208,500
Terra Bella	I	Treatment and Disposal	1972-73	38,400
	I	Treatment Plant Modifications	1980-90	55,000
	III	Class B Interceptor	1972-73	39,500
	IV	Trunk Sewers	1972-90	272,000

TABLE IX-2 (Continued)

STATEMENT OF PRIORITIES
RECOMMENDED WASTEWATER FACILITIES
TULARE COUNTY

City, Community, District, or Planning Area	Project Group (1)	Brief Description of Project (2)	Period of (3) Construction	Estimated Cost (4) (Dollars)
Sub-Planning Area G				
Camp Nelson	I	Treatment and Disposal	1972-73	218,100
	IV	Trunk Sewers	1972-90	342,800
Springville	I	Treatment Plant Improvements	1972-73	29,000
	I	Treatment Plant Improvements	1980-90	29,000
	IV	Trunk Sewers	1972-80	127,000
Sub-Planning Area H				
Three Rivers Area (d)	I	Treatment and Disposal	1972-73	1,070,000
	IV	Trunk Sewers	1972-73	1,458,000

(1) Project groups I and II are defined by the State Water Resources Control Board in Subchapter 7 (Clean Water Grant Program) of Chapter 3, Title 23, California Administrative Code.
(2) Includes pumping stations where required.
(3) Construction to take place during the period of time designated and project to be in operation by final fiscal year noted.
(4) From Chapter VIII (includes engineering and contingencies).

(a) Provides sufficient Capacity for Joint Project Number 1.
(b) Provides for necessary expansion of Visalia treatment facility.
(c) Immediate modification of the Lindsay industrial facilities is required. An application for financial assistance is under consideration.
(d) Based on Alternative A.

PROGRAMS AND POLICIES FOR IMPLEMENTATION AND UPDATING

Several aspects of implementation have been discussed, including the allocation of funding responsibility, determination of funding capacities, alternative methods of financing, and priorities for construction. This section presents some additional considerations regarding policies and programs for updating and implementation.

Monitoring Community Growth and Development

As indicated in Chapter III, the extent of future growth and development of certain communities is somewhat in doubt because of uncertainties in future patterns of migration, housing availability and economic activity. The water and sewer plans for communities which are expected to decline in population (see Table III-8) reflect such uncertainties by providing a "hedge" against the achievement of greater levels of growth and development than are anticipated as the result of population and economic projections.

It is particularly important that both growth and decline in community populations be monitored each year during the 1970-1980 decade so that annual changes may be aggregated and compared with population projections for ten-year intervals as provided in Chapter III. Each year (preferably as of July 1), the number of new housing units constructed during the previous year should be developed from city and county building permit records; allowance for housing demolitions should be made; and, current population estimates should be prepared based on family size characteristics for the census enumeration districts involved. By monitoring population growth (or decline), it will be possible to determine the rate of change and to assess the probable impact of such change on water and sewer system plans and priorities.

Mandatory Sewer Connection

If considerable public investment is to be made in new water and sewer facilities, if the investment in existing facilities is to be protected, and if water quality is to be preserved and enhanced, it is essential that the County develop and implement a policy which will require the connection of urban development to available water and sewer systems. Such a policy will require both the adoption of an ordinance which will require the connection of existing developed areas to existing systems and the adoption of planning policies and regulations which will assure that new development will be located where connection to systems is feasible.

A mandatory sewer connection ordinance which requires connection of existing development is a must! Such an ordinance, patterned, for example, after the successful program established by Fresno County, would provide for connection within a reasonable period of time. Such a time period may be three to five years, depending on the distance of existing development from available sewer systems and the financial capacity of property owners to meet this responsibility. In cases where existing development is grossly sub-standard, it may be more appropriate to first institute programs for relocating families in sound housing at locations where connection would be less costly.

Sewer System Extension Policies

For cities and special districts which provide sewer service, it is particularly important that trunk sewer lines be extended in reasonable anticipation of new development so that connection will be possible when required. Conversely, sewer extensions to undeveloped outlying areas should be avoided in communities where adequate building sites are available close-in as part of the extending community development pattern. In either case, it is vital that the provision of sewer service be viewed as an important tool in achieving the

most desirable community development patterns and the most convenient and efficient provision of public and private services required by people in an urban environment. Economics alone dictate that appropriate policies be developed for each community in relation to these objectives. In many communities, however, the major question is whether people will have the opportunity to improve the overall quality of life afforded within the community.

Water System Development Policies

Generally, a community has much greater flexibility in developing a water system than it has in the development of sewer system. Most communities can develop adequate water wells, each being close to the area to be served, and can avoid the unnecessarily high costs associated with a central water source serving a large area. In contrast, a sewer system normally requires a continuous collection system, involving increasingly larger sewer lines extending from the area served to the treatment plant.

There are three primary water system development policies which are important to implementation of this study: (1) insistence that potable water wells are developed which are capable of delivering adequate supplies for a community over a long period of time; (2) that supplemental surface water supplies be provided to the planning area to solve problems associated with the current overdevelopment of the groundwater reservoir; and (3) that management of water and sewer systems be coordinated, where possible.

The rationale for these policies is based on the fundamental consideration that the management of water and sewer systems involves far more than services of supply (water) and collection, treatment and disposal (sewer). Water and sewer systems are components of the overall task of water basin management.

If either component is operated without regard for its effect on the other, irreversible degradation of groundwater can occur. This problem is perhaps nowhere more apparent than in communities located in foothill and mountainous areas where water supplies are extremely limited and where geologic and soil conditions impose natural constraints upon alternatives available for developing and maintaining water supply and liquid waste management systems.

Water and sewer systems cannot therefore be viewed as simple systems which are independent of each other. They cannot be managed by private entities whose interests do not embrace concern for water basin management; and they cannot be managed without concern for the customers "right" to expect continuous and high quality service over a long period of time. For communities which do not now enjoy either central water or sewer service (or both), the County Service Area approach to system development and management described in the next section of this Chapter is recommended.

GOVERNMENTAL MANAGEMENT OF SYSTEMS IN UNINCORPORATED COMMUNITIES

The formation of a County Service Area (CSA) for the provision of water and sewer services to unincorporated communities has considerable merit. In addition to water and sewer service, a CSA may provide a variety of "extended" county services including: police protection; fire protection, park and recreation facilities; library services, and such miscellaneous services as street lighting, street sweeping, street construction to urban standards, refuse collection, garbage collection, ambulance service and other services not provided by the county to unincorporated communities.

The CSA is particularly applicable to those communities which are sufficiently urbanized and socially and economically stable that they are likely to increase levels of population and economic activity. The CSA law was developed specifically to provide an alternative method of providing urban services to outlying unincorporated areas. A CSA is governed by the Board of Supervisors; it can tax and bond for all services and facilities which may be required, paid for solely by the people benefiting within the CSA.

People residing within a CSA pay for services in relation to the extent of benefit received. Thus, tax rates may vary with the extent of benefit to each zone derived from services provided to property in each zone. This is particularly important, not only as a matter of equity to landowners, but also to permit the inclusion of substantial undeveloped acreage within the original boundaries to assure inclusion of all area likely to urbanize. A landowner can therefore include an agricultural parcel which he does not intend to develop or sell for development without fear that he will be taxed for services he does not receive.

Proceedings for the formation of a CSA may be instituted either by the Board of Supervisors on its own initiative, or by petition of at least 10% of the

registered voters within the proposed CSA. Approval by the Local Agency Formation Commission is required prior to the initiation of proceedings for formation. After public hearings, the CSA is formed if not protested by either 50% of the registered voters or by the owners of 50% or more of the value of land and improvements.

A critical policy consideration here is whether or not County government intends to provide urban services to unincorporated communities. If not, then the CSA offers the only realistic approach to make such a policy operational in fact. The current policy (or absence of policy) places county government in a position of responsibility for a wide variety of services which people of unincorporated communities either do not receive at all or receive inadequately. This problem was discussed at some length in Chapters II and III, but bears repeating here for emphasis. While this report has been primarily concerned with the needs for water and sewer service, the organizational framework by which such services are provided must be viewed as part of the total range of services required. The special problems facing communities which lack the financial capacity to provide even water and sewer service, and which are characterized by decline in the quality of life available for residents, are discussed in the final section of this chapter.

Sewer and Water System Operation and Maintenance

The proper operation and maintenance of sewer and water systems is a critical factor in assuring protection of public health, avoiding interruptions in service and assuring adequate service at reasonable cost. For those existing systems where operation and maintenance capabilities and financial capacities are adequate to meet these objectives, no special problems are posed. However, this is not the case for many communities which would obtain water and/or sewer systems for the first time. For these communities, it is proposed that

intergovernmental contracts be developed to share the costs of operation and maintenance, including manpower, equipment, and material, to assure high quality service at least cost to all communities participating. This may be accomplished by agreement among the participating parties, or by contracting with county government for operation and maintenance services.

Agreements among communities would necessarily be limited to communities which are in reasonable proximity to each other. This may be too impractical for communities in isolated locations. For communities close to a community which already possesses necessary capability, it may be most advantageous to contract with that community already providing service.

Perhaps the most practical alternative for most (if not all) communities would be to contract for services to be provided by the county. The county would maintain a qualified staff for this purpose, supported completely through the contractual service arrangement. This approach would assure consistent plant operation and maintenance and would relieve local districts of the worry and financial burden associated with independent staffing.

OBSTACLES TO IMPLEMENTATION

An obstacle of serious proportions to implementation of water and sewer plans is the limitation of funding capacity in all but a few of the communities included in this study. A comparison of bond funding capacity (see Table IX-1) and project costs (see Tables VIII-3 and VIII-4) provides a first order of magnitude estimate of this limitation. Even with the assumption that up to 50% of project costs would be eligible for assistance under various grant programs of state and federal government, the disparities between funding capacity and capital project costs are, in most cases, overwhelming!

As discussed in Chapter III, the major development issues for many communities are population and economic decline, high percentages of sub-standard housing, and the absence of the range of urban services and facilities required for the resident population. It was concluded that "...lack of water and sewer service is but one set of criteria to be considered" and that "the totality of social, economic, physical, cultural and esthetic deprivation which exists in varying degrees in many communities, and its consequent impact upon the people (of those communities) is the real issue". Chapter III further concludes that "...the problems posed ... for certain communities also insists that a broader program be developed to cope with the range of problems ...than merely denying some communities access to funds for the development of water and sewer systems".

From the financial gaps apparent in comparing funding capacity and capital project costs, and in consideration of quality of life conditions in many communities, it is clear that any broad program which could be developed to reconcile these issues is beyond the capacity of county government to attempt without substantial commitment by the state and federal government.

It is unfortunate that the issues facing most unincorporated communities in Tulare County are not unique; if they were, it would perhaps be easier to develop the public commitment required to alleviate them. However, these issues are multiplied many fold among agricultural counties of the state and the entire nation. There literally are hundreds of communities in the same straits within California alone. What then is the answer? What does this mean for Tulare County?

One conclusion certainly is that the county cannot afford to be a party to any program which would bankrupt a community with debts for water and sewer systems in the face of a greater totality of physical, economic and human needs which will remain unsatisfied. The funding of water and sewer systems in some communities, even with 100% grants, will only compound the problem.

To accept this conclusion then is to accept the immediate need for the development of a vigorous program, attempted first on a pilot basis, to achieve the relocation of people from declining communities to communities where there is a better chance to fulfill human needs. Total federal and state support of such a program should be sought with all stops pulled to gain its approval. Monies which might be available for water and sewer projects should be reallocated to the more viable communities. Additional monies should be provided to relocate families without loss of equity in current homes and land -- i.e., to effect a complete transfer of interest from one community to another, even if necessary to the extent of relocating an entire neighborhood of people (if they desire) in order to retain long-established social relationships and values which are held to be of far greater value by some people than the entire gamut of urban services.

Assuming that such a program was initiated and was successful, its application to all communities deserving of such effort would still take years. A second conclusion then is that water and sewer system projects should be concentrated only among those communities where systems already exist and where system improvement is likely to be a positive force for economic development. Those communities which necessarily would be bypassed by such a system of priorities would remain essentially as they are unless public health hazards existed which could not be tolerated. In such cases, a modest investment in community water wells might suffice. If the hazard is caused by un-treated sewage and threatens contamination of water supplies, there may be no alternative other than to order a discontinuation of occupancy. Such a drastic order is not likely to be required in communities on the valley floor, but could be necessary in foothill and mountain communities. An order of this type would probably emanate from the State Water Quality Control Board, under the Porter-Cologne Act.

The problems posed in the Three Rivers area are worthy of special attention. In this area, a number of natural physical constraints combine with economic considerations to create enormous obstacles to meeting community water and sewer system requirements.

With a resident population of approximately 400 families, and a considerable potential for expanded population and economic activity, the Three Rivers community virtually has reached the point of no return; it must both face up to the costs of central water and sewerage systems while accepting a policy of strict limitation on further urban expansion!

The alternatives for sewage treatment in Three Rivers are limited to either transportation of effluent to a point outside of the basin or collection and treatment of sewage within the basin. A sewage system by one means or the

other is already an absolute must to serve developed areas, with a price tag in the range of $1.5 million to $2 million to local residents in addition to monies which might be obtained through state and federal programs. Predicated on their ability to secure bonding, this would mean an annual per family contribution of between $350 and $400.

A monumental problem for Three Rivers is to provide water of sufficient quality and quantity to meet current and projected demands for water. However, Three Rivers must depend essentially upon water from the Kaweah River. Underground aquifers in this area have finite limits which essentially have already been reached. An impasse has been reached by the need for a highly sophisticated form of sewage treatment to prevent further contamination of local water supplies and the unavailability of supplemental sources of water needed for community growth. Thus, the "carrying capacity" of the Three Rivers area to accept further population and economic expansion is at or near its peak, not because of any public policies which are intended deliberately to limit growth and development in the Three Rivers basin, but because of the harsh realities of constraints imposed by natural physical limitations of the basin on the maintenance of groundwater quality and its consequent capacity for accommodating further urbanization.

APPENDIX A

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V-5	Personal interview with Peter J. Byrne, City Manager and Dan Prizznick, Public Works Director, City of Lindsay, December 1970 and January 1971.

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V-7	Personal interview with Ted Iles, Superintendent, Strathmore Public Utility District, March 1971.
V-8	"Basis for Requirements, Citrus Packing Waste Discharges, Tulare and Fresno Counties," by California Regional Water Quality Control Board, Central Valley Region.
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V-13	Wastewater Disposal Reports on Linnell and Woodville Farm Labor Centers, by Charles K. Hopkins and Associates, Water Quality Control Consultants, 8 March 1970.
V-14	Letter to California Regional Water Quality Control Board describing status and deficiencies of sewerage facilities in the City of Lindsay, from Peter J. Byrne, City Manager, dated 22 January 1971.
VI-1	Personal interview with Edmond S. Cary, Senior Sanitary Engineer and Theodore N. Andrews, Sanitary Engineer, State of California, Department of Public Health, November 1971.
VI-2	"Improvement Standards of Tulare County," adopted on 21 April 1970 by the Tulare County Board of Supervisors.
VI-3	"Standard Schedule for Grading Cities and Towns of the United States with Reference to their Fire Defenses and Physical Conditions," National Board of Fire Underwriters, 1956 with 1964 amendments.

APPENDIX A (Continued)

LIST OF REFERENCES

Number	Reference
VII-1	Scheme developed by L. V. Wilcox and O. C. Magistad, "Interpretation of analysis of irrigation waters and the relative tolerance of crop plants," mimeographed by the U. S. Regional Salinity Laboratory 1943.
VII-2	"Interim Water Quality Management Plan, Central Valley Basin, San Joaquin River Subbasin - Tulare Lake Subbasin, Volume Two," by the California Regional Water Quality Control Board, June 1971.
VII-3	"Consulting Engineering, A Guide for the Engagement of Engineering Services," American Society of Civil Engineers, Manual and Report on Engineering Practice No. 45.
VIII-1	Personal interview with W. E. Wilson, Superintendent, Orosi Public Utility District, January and February 1971.
VIII-2	Personal interview with Hubert T. Green, Public Works Director, and Glen R. Quinn, treatment plant operator, City of Farmersville, February 1971.
VIII-3	"Laspina-Levin Sewer Project, City of Tulare," by Fred N. Rabe Engineering, Inc., April 1970.
VIII-4	"Report to the Consolidated Olive Growers and the City of Lindsay, California, upon Brine Treatment and Disposal," by Metcalf & Eddy Engineers, July 1970.
VIII-5	Letter to Farmers Home Administration regarding proposed sewerage facilities for the Terra Bella Sewer Maintenance District, from Fred A. Strauss of Althouse-Strauss Engineering Services, dated 31 October 1969.
VIII-6	"General Plan, City of Porterville, California, Public Services, and Facilities," by Koebig & Koebig Inc. and Hahn, Wise and Associates, Inc., October 1965.
IX-1	"Ground Water Basin Management," prepared by the Committee on Ground Water of the Irrigation and Drainage Division of the American Society of Civil Engineers, 1961.

APPENDIX B

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Berkeley, California
May 1967

(From Reference V-9)

SOIL LIMITATION RATING FOR SEPTIC TANK FILTER FIELDS

Definition and Scope:

The septic tank filter field is a part of the septic tank absorption system for onsite sewage disposal. It is a subsurface tile system laid in such a way that effluent from the septic tank is distributed with reasonable uniformity into the natural soil. Criteria and standards used for rating soils are made on the basis of soil limitations.

Three degrees of limitations are used: slight, moderate, and severe. These are based on factors such as soil depth, slope, permeability, percolation rate, water table, soil drainage, and overflow or flooding hazards.

Assumptions:

Minimum depth earth cover over lines .... 12 inches
Minimum diameter of lines .... 4 inches
Minimum filter material over lines .... 2 inches
Minimum filter material under lines .... 12 inches

Criteria:

Soil Property or Quality	Degree of Soil Limitation		
	Slight	Moderate	Severe
Permeability (in./hr.)	Greater than 1.0	1.0-0.63	Less than 0.63
Percolation rate (min./in.)	Faster than 45	45-75	Slower than 75
Depth to seasonal water table (ft.)	Greater than 4	2-4	Less than 2
Drainage class	Excessively, somewhat excessively, well*	Moderately well, somewhat poorly	Poorly, very poorly
Depth to impervious bedrock and hardpan, and permanent water table (ft.)	Greater than 6	4-6	Less than 4
Slope (%)	0-5	5-9	Greater than 9
Overflow hazard (frequency in years)	None	1 in 10	1 in 5
Overflow duration (hr.)	None	Less than 48	Greater than 48

*Coarse textured materials may allow contamination of water supplies.

References:

(1) International Conference of Building Officials. 1964. Uniform building code.

(2) Western Plumbing Officials Association. 1964. Uniform plumbing code.

APPENDIX B (Continued)

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Berkeley, California
August 1967

SOIL LIMITATION RATINGS FOR SEWAGE LAGOONS

Definition and Scope:

Sewage lagoons are shallow lakes used to hold sewage for the time required for bacterial decomposition. Sewage lagoons require consideration of soil for two functions: (A) as a floor for the impoundment area, and (B) as a source of embankment material. The requirements for the embankment are the same as for other embankments designed to impound water. There must be adequate soil material available that is suitable for the structure and, when properly constructed, the lagoon must be capable of holding water with minimum seepage.

Soils are grouped into three degrees of limitations: slight, moderate, and severe.

Assumptions:

Depth of liquid - 2 to 5 feet.

Impervious soils of basin - at least 1 foot thickness.

Criteria:

A. Soil as a Floor for Impoundment Area

Soil Property or Quality	Class Definition and Degree of Limitation for Lagoon Basin Floors		
	Slight	Moderate	Severe
Permeability (in./hr.)	Less than 0.63	0.63-2.0	More than 2.0
Depth to hard rock (ft.)	More than 5	3-5	Less than 3
Slope and relief(%)	Less than 2	2-9	More than 9
Organic matter (%)	Less than 2	2-15	More than 15
Coarse fragments: less than 10" dia. (% by volume)	Less than 20	20-50	More than 50
more than 10" dia. (% of surface area)	Less than 3	3-15	More than 15
Soil texture (Unified Classification)	GC, SC, CL, CH	GM, ML, MH SM (20-50% fines*)	SM (less than 20% fines*), GW, GP, SW, SP, OL, OH, Pt
Soil texture (USDA) and predominant clay mineral	c (mixed or mont.), sic, gc, sicl, cl, scl, sil (more than 18% clay), l	c (kaolinitic), sil (less than 18% clay), vfsl, sl, gravelly silty material	Gravels and sands, organic (15-30% O.M.), silts and clays, peat and mucks

Criteria (Continued):

B. Soil as a Source of Embankment Material			
Soil Property or Quality	Class Definition and Degree of Limitation		
	Slight	Moderate	Severe
Soil texture (Unified Classification)	GC, SC, SM (20-50% fines*)	GM, CL, CH, ML, MH, SM (less than 20% fines*)	GW, GP, SW, SP, OL, OH, Pt
Soil texture (USDA)	gc, cl, scl	c, sic, sicl, sil, vfsl, l, sl	gravels and sands, organic (15-30% O.M.), silts and clays, peat and mucks

* "fines" - less than .074 mm. (200 mesh)

References:

(1) United States Department of Housing and Urban Development. 1960. Community sewage systems, "design guides for sewage stabilization basins." Fed. Housing Adm. series No. 1833.

APPENDIX C

STATEMENT OF GOALS
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

(From Reference VII-1)

1. Protect and enhance all state waters, surface and underground fresh and saline, for present and anticipated beneficial uses including aquatic environmental values.

2. Manage municipal and industrial wastewaters as part of an integrated system of fresh-water supplies to achieve maximum benefit of fresh-water resources.

3. Achieve maximum use of fresh-waters through wastewater reclamation and reuse.

4. Review waste treatment systems to assure effective treatment and adequate capacity is available at all times.

5. Develop a planned system for water use and waste discharge to assure protection of the aquatic resources for future beneficial uses and achieve harmony with the natural environment.

APPENDIX D

STATEMENT OF OBJECTIVES CONCERNING WATER SUPPLY, TULARE COUNTY DEPARTMENT OF PUBLIC HEALTH

The Tulare County Health Department's Domestic Water Supply Program is based on the following objectives:

1. To assure that domestic water supplies are wholesome, safe and potable, and available in adequate quantity and at sufficient pressures.

2. Identify those biological, chemical, and physical conditions that tend to disrupt or pose a threat to the wholesomeness and potability of the sources of domestic water.

3. Encourage and promote the fluoridation of all public water supplies within the county.

4. Survey the domestic water supply needs of urbanized communities and encourage public water delivery system.

5. Participate with the Planning Department in the development of new residential and commercial communities with respect to water supply.

6. Take all necessary action for the review, issuance or denial of public water supply permits.

7. Carry out surveillance and preventative and control measures to achieve maximum safety and wholesomeness of domestic waters.

8. Provide assistance to water supply systems in case of emergencies or breakdown, investigate consumer complaints of poor water quality and suspected waterborn illness.

APPENDIX E

RECORDED WATER CONSUMPTION (1)
TULARE COUNTY

City, Community District, or Planning Area	Year Of Record	Maximum Water Use (mgd)	Minimum Water Use (mgd)	Per Capita Consumption (max/min)
Sub-Planning Area A				
Cutler	1963	1.15	0.40	500/173
London	1966	0.20	0.05	166/42
Orosi	1967	0.29		644/
Sub-Planning Area B				
Exeter		2.26	1.32	410/240
Goshen	1960	0.27	0.13	254/122
Ivanhoe	1960	0.38	0.32	235/198
Woodlake	1969	1.50	0.50	416/138
Sub-Planning Area D				
Lindsay		3.37	1.10	590/192
Strathmore	1969	0.63	0.20	420/131
Sub-Planning Area E				
Earlimart	1969	1.20	0.60	400/200
Pixley	1970	0.39	0.32	175/146
Tipton	1964	0.40	0.10	423/105
Woodville		0.27	0.06	261/58
Sub-Planning Area F				
Poplar	1964	0.68	0.26	367/140
Springville	1969	0.57	0.09	380/60

(1) From Reference VI-1.

APPENDIX F

GLOSSARY OF TERMS

Acre-foot - A volume of water one foot deep and one acre in area (43,560 cubic feet).

Activated sludge - Sludge settled out of sewage previously agitated in the presence of abundant atmospheric oxygen.

Aerated lagoon - (See oxidation pond).

Aeration cell - Tank in which air is mixed with sewage.

Aerator - A device that promotes the intimate contact of air and a liquid.

Aquifer - A porous, water-bearing geologic formation.

Biological decomposition - Breakdown of complex material into simpler substances by biological means.

Clarifier - A unit whose primary purpose is to reduce the concentration of suspended matter in a liquid.

Clarigester - A sludge digestion tank equipped with separate compartments, one which contains clarifier mechanisms and another which digests sludge.

Coliform - A group of organisms, whose presence is a satisfactory bacteriological indicator of contamination of pollution in water.

Cone of depression - The depression, roughly conical in shape, produced in a water table by the extraction of water from a well at a given rate.

Connate water - Water entrapped in the interstices of rock material when the material was deposited.

Comminution facilities - Units in which cutting and screening of solids contained in wastewater flows takes place before liquid continues on into treatment plant.

Detention time - The theoretical time required to displace the contents of a tank at a given rate of discharge (volume divided by rate of discharge).

Digester - A tank in which sludge is placed to permit digestion to occur.

Dissolved oxygen - The oxygen dissolved in water, wastewater, or other liquid usually expressed in milligrams per liter or percent of saturation.

Effluent - Wastewater, treated or not, flowing out of a reservoir, basin, or treatment plant.

Evapo-percolation pond - Ponds where liquid is disposed of by a combination of evaporation into the air and percolation into the soil.

Facultative - Have the ability to adapt.

Grit chamber - Enlarged channel, or a tank, in which the velocity of flow-through is so controlled that only the heavier solids, of 0.2 mm or larger, are deposited.

Imhoff tank - Two-story sedimentation chamber and septic tank, combining sedimentation in the upper compartment and sludge digestion in the lower compartment.

Leaching trenches - Trenches where liquid is held to allow its disposal by downward or lateral drainage, or both, into the surrounding permeable soil.

Liter - 1.0567 liquid quart.

Manning's equation - A formula to determine the average velocity of flow. A coefficient of function is used depending on the type of material used in construction of the channel. The common coefficient for concrete sewers is N = 0.013, in the formula $V = \frac{1.486}{N} R^{2/3} S^{1/2}$ where R = hydraulic radius, S = hydraulic gradient, and V = velocity.

Oxidation pond - Basin used for the retention of wastewater before final disposal, in which biological oxidation of organic material is effected by natural or artificially accelerated transfer of oxygen to the water from the air.

Oxygenation - Supplying of oxygen to a liquid.

Percolation pond - Pond in which liquid is held to allow it to filter down through a contact or filtering medium, usually the soil in which the pond has been constructed.

Primary clarifier-digester - A part of a first stage treatment in which the effluent is clarified and sludge is digested to some degree.

Primary treatment - The removal of a substantial amount of suspended matter, but little or no colloidal and dissolved matter.

Secondary treatment - The treatment of wastewater by biological methods after primary treatment by sedimentation. This can also include disinfection, commonly done by chlorination.

Septic tank - Horizontal, continuous flow, one-story sedimentation tank through which sewage is permitted to flow slowly to allow settleable matter to settle to the bottom, where it is retained until anaerobic decomposition is established.

Sludge - Accumulated suspended solids of sewage deposited in tanks or basins, mixed with more or less water to form a semi-liquid mess.

Sludge digester - Unit in which organic or volatile matter in sludge is gasified, liquified, mineralized, or converted into more stable organic matter through the activities of either anaerobic or aerobic organisms.

Spalling - Chipping or crumbling of the cement or stone.

Specific yield of soils - quantity of water that a unit volume of permeable rock or soil, after being saturated, will yield when drained by gravity.

Stabilization pond - Oxidation pond-lagoon-pool or pond constructed and maintained under specified conditions for the treatment of sewage, effluent or sludge which results in biological stabilization oxidation, nitrification, or reduction in volume.

Tertiary treatment - Removal of dissolved chemicals which may be undesirable in concentrations in the effluent, such as nitrates, phosphates, etc.

Trickling filter - Bed of coarse, rough, hard material over which sewage is sprayed or otherwise distributed and then allowed to trickle downward through the filter in contact with the air.

Wet Well - A compartment in which a liquid is collected, and to which the suction pipe of a pump is connected.

Zoogleal matrix - The jelly-like masses formed primarily by slime-producing bacteria in the activated sludge process or in biological beds.

ABBREVIATIONS

BOD - Biochemical oxygen demand = quantity of oxygen used in the biochemical oxidation of organic matter in a specified time, at a specified temperature, and under specified conditions.

Cfs - Cubic feet per second.

Cl_2 - Chloride

Fps - Feet per second.

5-day 20°C BOD - A BOD test made where the sewage is incubated for 5 days at 20°C before measurement of oxygen is determined.

Gcd - Gallons per capita per day.

Mg - Million gallons.

Mgd - Million gallons per day

Ml - Milliliter = one thousandth of a liter.

Mpn - Most probable number = an index of the coliform bacteria which more probably than any other number would give results shown by laboratory tests.

Prepared By: Tulare County Planning Department

Prepared By: Tulare County Planning Department